Supreme Court, U.S.
FILED
MAY 9 1980
MICHAEL RODAK, JR., CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1979

79-1789

No. —

COTTON WAREHOUSE ASSOCIATION and
AMERICAN COTTON SHIPPERS ASSOCIATION,
Petitioners,

v.

RAY MARSHALL, SECRETARY OF LABOR, *et al.*,
Respondents.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

NEAL P. GILLEN
1707 L. Street, N.W.
Suite 460
Washington, D.C. 20007
Counsel for the American Cotton Shippers Association

CARL W. VOGT
KEITH A. JONES
JOYCE E. REBACK
FULBRIGHT & JAWORSKI
1150 Connecticut Ave., N.W.
Suite 400
Washington, D.C. 20036
Counsel for the Cotton Warehouse Association

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Respondents.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

The Cotton Warehouse Association ("CWA") and the American Cotton Shippers Association ("ACSA") hereby petition for a writ of certiorari to review the judgment of the United States Court of Appeals for the District of Columbia Circuit in this case.

OPINION BELOW

The opinion of the Court of Appeals, App. A, *infra*, is not yet reported.

JURISDICTION

The judgment of the Court of Appeals was entered on October 24, 1979, App. B, *infra,* and amended on January 11, 1980. App. C, *infra.* A timely petition for rehearing, with suggestion for rehearing *en banc,* was denied on January 11, 1980. App. D, *infra.* On April 2, 1980, the Chief Justice extended the time for filing the petition for a writ of certiorari to and including May 10, 1980. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

QUESTIONS PRESENTED

1. Whether the Occupational Safety and Health Administration ("OSHA") has authority to prescribe occupational health standards in the absence of any evidence that employees in the affected industries are subject to material impairment of health.

2. Whether a court of appeals adequately fulfills its statutory responsibility of determining whether OSHA's findings are supported by substantial evidence in the record considered as a whole when it declines to review the evidence, including the medical evidence, and instead considers only OSHA's articulation of its conclusions.

3. Whether OSHA has authority to prescribe occupational health standards without first finding, on the basis of substantial evidence, that such standards would benefit the employees at the affected workplaces.

STATUTORY PROVISIONS INVOLVED

Section 3(8) of the Occupational Safety and Health Act of 1970, 29 U.S.C. § 652(8), provides:

> The term occupational safety and health standard means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes reasonably necessary or appropriate to provide safe or healthful employment and places of employment.

Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5), provides:

> The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired.

Section 6(f) of the Act, 29 U.S.C. § 655(f), provides in pertinent part:

> The determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole.

STATEMENT OF THE CASE

Section 3(8) of the Occupational Safety and Health Act, 29 U.S.C. § 652(8), authorizes the Secretary of Labor, acting through the Occupational Safety and Health Administration ("OSHA"), to prescribe occupational safety and health standards "reasonably necessary or appropriate to provide safe or healthful employment and places of employment." Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5), however, contemplates that this authority shall be exercised solely for the purpose of protecting against "material impairment of health or functional capacity." Under section 6(f) of the Act, 29 U.S.C. § 655(f), the imposition of occupational safety and health standards will be upheld only if "supported by substantial evidence in the record considered as a whole."

In 1978, OSHA prescribed a comprehensive health standard governing occupational exposure to cotton dust. *See* 43 Fed. Reg. 27350 (June 23, 1978), *as amended,* 43 Fed. Reg. 28473 (June 30, 1978), 43 Fed. Reg. 35032 (August 8, 1978), 43 Fed. Reg. 56892 (December 5, 1978). The standard was promulgated in order to reduce the prevalence of byssinosis, a respiratory condition that, according to studies of workers in the textile industry, *see* 43 Fed. Reg. at 27352-54, has been associated with exposure to dust generated by textile manufacturing processes. Application of the standard, however, is not limited solely to the textile

industry. The standard is also made applicable to a variety of other industries, including cotton warehouses and cotton classing offices, that are engaged in the handling of cotton. 43 Fed. Reg. at 27381.[1] This is so even though byssinosis has never been documented or diagnosed in any form among workers in cotton warehouses or cotton classing offices.

The standard imposes, *inter alia,* maximum permissible exposure limits ("PEL's") for the amount of dust that may be present in the workroom. For the textile industry, OSHA prescribed a PEL of 200 micrograms of lint-free "respirable cotton dust" per cubic meter of air in "yarn manufacturing" and of 750 micrograms in "slashing and weaving" operations. 29 C.F.R. § 1910.1043(e)(1), (2). For the affected industries other than the textile industry, OSHA prescribed a PEL of 500 micrograms per cubic meter of air. 29 C.F.R. § 1910.1043(e)(3).

OSHA broadly defined "cotton dust" to include "all dust present wherever cotton fibers or cotton by-products are processed." 29 C.F.R. § 1910.1043(b). One reason given by OSHA for this all-inclusive definition is that the precise agent causing byssinosis is unknown. 43 Fed. Reg. 27354; App. A, *infra,* at 61a. A prime suspect, however, is the plant and leaf debris that adheres to cotton lint during harvesting and ginning. *See, e.g.,* Morey & Wakelyn, "Plant Trash in Linters and Wil-

[1] OSHA treated all of the various and diverse cotton-related industries other than textile manufacturing as a single entity for purposes of compliance with the standard. The record reveals, however, that each of the so-called "non-textile" industries operates in a unique manner and may produce dust, if at all, of different chemical compositions. *See* 43 Fed. Reg. at 27360-61, 27367-69. OSHA ignored these distinctions entirely, and imposed a uniform standard for all such workplaces.

lowed Pickers," 37 *Am. Ind. Hyg. Ass'n J.* 413-417 (1976), Ex. 75f. A comparison of the dusts present in various workplaces reveals that textile cardrooms—in which byssinosis has been documented—produce dust which is relatively high in plant material, while the dust in warehouses and classing offices is low in plant content.[2]

Dust in warehouses and classing offices is likely to be far less respirable than dust in textile mills. Respirable dust is created when plant particles are pulverized into smaller particles by high-speed manufacturing operations, such as those in textile mills. The less pulverizing the mechanical operations, the larger and less respirable are the particles. There are no pulverizing operations in cotton warehouses or classing offices. Accordingly, the dust present therein contains large and, for the most part, nonrespirable particles.[3]

Reflecting these differences between warehouses and classing offices, on the one hand, and textile mills, on the other, the rulemaking record before OSHA contained no evidence of a material health impairment among workers in warehouses and classing offices. To

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[2] Approximately 25% of the total dust in textile cardrooms is composed of plant debris, compared to only 10.5% to 16.7% of the total dust in warehouses. Statement of Phillip J. Wakelyn, Ph.D., Ex. 95b at 15, Table 6 ("Wakelyn"), J.A. 2949-74. ("J.A." refers to the joint appendix filed with the court of appeals.) Warehouse dust is composed primarily of minerals and fibers, *id.* at 14-21, J.A. 2963-70; classing room dust is composed primarily of cellulose and contains very little plant or soil-borne elements. Brown *et al.*, "Chemical Composition of Dust Generated During Cotton Processing," *Proceedings of the 1977 Beltwide Cotton Production Research Conference*, Ex. 72b at 55.

[3] Wakelyn at 8-11, J.A. 2957-60; Statement of Earle M. Billings, Ex. 112, J.A. 3131-35.

the contrary, the only medical evidence consisted of a study involving only one warehouse, and even this did not support OSHA's conclusion that warehouse workers are subject to any material impairment of health—let alone byssinosis.[4] There is absolutely no evidence in the record regarding the health of classing office workers.

After promulgation of the standard, CWA and ACSA sought judicial review in the United States Court of Appeals for the District of Columbia and Sixth Circuit respectively. These petitions were consolidated with others in the District of Columbia Circuit. Petitioner CWA is the national trade association representing cotton warehouses; petitioner ACSA is the trade association representing cotton classing offices. CWA and ACSA opposed application of the standard to their respective industries.

On review, the court of appeals held that OSHA may promulgate a standard even if the affected workers have not been shown to suffer from a "material impairment of health or functional capacity" within the meaning of section 6(b)(5) of the Act. The court determined that OSHA need only decide that workers are subject to a "risk" of becoming materially impaired in order to justify industry-wide imposition of comprehensive health standards. App. A, *infra,* at 34a-35a, 63a. The court further ruled that OSHA need not prove the existence of a hazard in each regulated workplace or even in each regulated industry; it suffices if OSHA merely infers the existence of a "risk"

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[4] Statement of Martin L. Barman, M.D., Ex. 56, J.A. 2174-88.

on the basis of data extrapolated from unrelated industries. *Id.* at 61a-62a.

In addition, the court held that, in reviewing the lawfulness of an occupational safety and health standard, it need not "resolve controversies over technical data," *id.* at 27a, but is required only to verify that OSHA conducted a hearing and posited some explanation for its conclusions. *Id.* at 64a. Thus, the court left solely to OSHA the responsibility for policing the requirement of section 6(f) of the Act that the findings underlying an occupational safety and health standard be "supported by substantial evidence in the record considered as a whole."

Finally, the court held that OSHA need not conduct an analysis of the relationship of the projected economic costs to the anticipated health benefits of an occupational safety and health standard, *id.* at 56a, but instead is required only to establish the economic and technological feasibility of the standard. *Id.* at 56a, 67a.[5] The court apparently believed that even if OSHA only alleges that a benefit can be anticipated, the standard is "reasonably necessary or appropriate" within the meaning of section 3(8) of the Act, regardless of the costs of compliance.

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[5] The other "non-textile" petitioner in this proceeding is the National Cottonseed Products Association, the national trade association for cottonseed oil mills. With respect to this petitioner, the court of appeals found that OSHA's position on economic feasibility was "neither clear nor adequately supported by the record," App. A, *infra*, at 69a, and remanded to the agency for supplementation or clarification. *Id.* at 84a.

REASONS FOR GRANTING THIS PETITION

The court of appeals, without undertaking an independent review of the rulemaking record, has endorsed OSHA's regulation of industries whose workers have not been shown to suffer any material impairment of health and has sustained the imposition of occupational health standards that have not been shown to produce any benefits. Since review of all OSHA standards may be had in the court below, the court's decision, if permitted to stand, will form the basis of and justify an aggressive expansion of OSHA's authority, far beyond the carefully tailored limits prescribed by Congress. Moreover, in essential respects the decision below conflicts with the decision of the Fifth Circuit in *American Petroleum Institute* v. *OSHA*, 581 F.2d 493 (5th Cir. 1978), *cert. granted sub nom. Marshall* v. *American Petroleum Institute*, 440 U.S. 906 (1979). This case therefore warrants review on certiorari.

1. Section 6(b)(5) of the Occupational Safety and Health Act, 29 U.S.C. § 655(b)(5), provides that OSHA's novel power to prescribe industry-wide occupational safety and health standards shall be exercised for the purpose of protecting against "material impairment of health or functional capacity." In prior cases the validity of an OSHA health standard was premised upon a determination that, in the absence of the protection afforded by the standard, the affected workers would be subject to "material" health impairment. *See, e.g., American Iron & Steel Institute* v. *OSHA*, 577 F.2d 825 (3d Cir. 1978), *petition for cert. pending*, Nos. 79-918 and 79-919; *Society of Plastics Industry, Inc.* v. *OSHA*, 509 F.2d 1301 (2d Cir.),

cert. denied, 421 U.S. 992 (1975); *Industrial Union Dep't* v. *Hodgson,* 499 F.2d 467 (D.C. Cir. 1974).

In this case, however, the court of appeals departed from this settled understanding of the Act. The court held not just that OSHA need not establish the fact of material health impairment, but even that the agency is not required to demonstrate that affected workers are suffering from any adverse symptoms. App. A, *infra,* at 34a-35a. The court ruled instead that OSHA is empowered to regulate merely upon its speculation that workers may face a "risk" of illness. *Id.* at 63a. Thus, the court affirmed the application of OSHA's cotton dust standard to warehouses and classing offices, notwithstanding the absence of medical evidence indicating the existence of material health hazards in warehouses and the absence of any medical evidence at all with respect to classing offices.

The court reached this extraordinary result by uncritically approving OSHA's reliance on data extrapolated from the domestic textile industry and from equally unrelated foreign "non-textile" industries. App. A, *infra,* at 61a-62a. While extrapolation may be justified in some instances,[6] it is plainly improper where, as here, there is no substantial similarity be-

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[6] *See* Synthetic Organic Chemical Mfrs. Ass'n v. Brennan, 503 F.2d 1155 (3d Cir. 1974), *cert. denied,* 420 U.S. 973 (1975), where the Third Circuit approved OSHA's extrapolation of data from animal studies to establish that a substance caused cancer in humans. 503 F.2d at 1159. In the case of cancer, however, courts have recognized the need for action "based upon lower standards of proof than otherwise applicable." Certified Color Mfrs. Ass'n v. Mathews, 543 F.2d 284, 297-98 (D.C. Cir. 1976). *See also* Environmental Defense Fund v. EPA, 598 F.2d 62 (D.C. Cir. 1978). No one has alleged that the dust found in warehouses or classing offices causes cancer.

tween the industries at issue and those for which data is available.[7] Warehouse and classing office workers may not be exposed to the same chemical substance as are textile workers; the dust in these workplaces may not be as respirable as dust in textile operations. *See* pp. 5-6, *supra*. Moreover, if warehouse workers are indeed subjected even to a "risk" of material health impairment, surely some of them would be suffering from the same diseases as are found among textile workers. But they are not.

The decision below improperly gives OSHA carte blanche to regulate whenever it decides that workers in a particular industry may be subject to a "risk" of material health impairment, even if their demonstrated state of health evidences no impairment in fact. Congress did not intend OSHA to possess such undisciplined power to intrude into the workplace. To the contrary, Congress specifically limited the agency's jurisdiction to "material" health impairments, rather than to "any" such impairments, precisely because "[a]bsolute safety is an impossibility and it will only create confusion in the administration of this act to set clearly unattainable goals." 116 Cong. Rec. 37614 (1970) (remarks of Sen. Dominick). The decision below improperly enlarges OSHA's jurisdiction far beyond that contemplated by Congress and therefore should be reversed.

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[7] In Society of Plastics Industry, Inc. v. OSHA, *supra*, for example, the Second Circuit approved OSHA's extrapolation from data regarding production workers in applying the vinyl chloride standard to fabrication workers. 509 F.2d at 1310. The court noted, *inter alia*, that two deaths had occurred among fabricators. *Id.* In contrast, OSHA had no evidence that warehouse and classing office workers are suffering from the same disease as are textile workers.

2. The court of appeals effectively ignored the requirement of section 6(f) of the Act, 29 U.S.C. § 655 (f), that OSHA standards be supported by "substantial evidence in the record considered as a whole." In so doing, the court applied a standard of review that deviates significantly from the time-honored responsibility of the reviewing court to ensure that a rule or order is based upon a consideration of all relevant factors in the record. *See, e.g., Universal Camera Corp.* v. *NLRB,* 340 U.S. 474 (1951).

It is the duty of a reviewing court to scrutinize the underlying record, no matter how factually complex that record may be, in order to verify the correctness of an agency's actions. *See, e.g., Ethyl Corp.* v. *EPA,* 541 F.2d 1 (D.C. Cir.), *cert. denied,* 426 U.S. 941 (1976). *International Harvester Co.* v. *Ruckelshaus,* 478 F.2d 615 (D.C. Cir. 1973); *Portland Cement Ass'n* v. *Ruckelshaus,* 486 F.2d 375 (D.C. Cir. 1973); *Greater Boston Television Corp.* v. *FCC,* 444 F.2d 841 (D.C. Cir. 1970), *cert. denied,* 403 U.S. 923 (1971). In the instant case, however, the court abstained from any substantive analysis of the record, reasoning that it suffices if "OSHA . . . explained the evidence it used, the reasons for its conclusions, and its responses to the industries' evidence and objections." App. A, *infra,* at 64a.

The court of appeals thereby abandoned the judiciary's traditional responsibility to guard against arbitrary and capricious administrative action. The correct approach to this reviewing function is represented by the court's earlier decision in *Ethyl Corp.* v. *EPA, supra.* In that case, the court recognized that "it must

engage in a 'substantial inquiry' into the facts, one that is 'searching and careful.' . . . This is *particularly* true in highly technical cases such as this one." 541 F.2d at 35 (emphasis added), *quoting Citizens to Preserve Overton Park* v. *Volpe,* 401 U.S. 402, 415 (1971). The court further explained:

> A court does not depart from its proper function when it undertakes a study of the record, hopefully perceptive, even as to the evidence on technical and specialized matters, for this enables the court to penetrate to the underlying decisions of the agency, to satisfy itself that the agency has exercised a reasoned discretion, with reasons that do not deviate from or ignore the ascertainable legislative intent.

541 F.2d at 35-36, *quoting Greater Boston Television Corp.* v. *FCC, supra,* 444 F.2d at 850. The decision below falls far short of the standard articulated in *Ethyl Corp.*

The standard of review applied by the court below resulted in marked unfairness to cotton warehouses and classing offices. No medical evidence supported the imposition of occupational safety and health standards on those industries. Indeed, the only pertinent evidence of record, a study of warehouse workers, found that the workers studied suffered from neither byssinosis nor work-related chronic respiratory disease. OSHA nevertheless overrode the absence of supportive evidence with respect to the warehouse and classing office industries by emphasizing the data pertaining to the technologically and environmentally different textile industry. The court of appeals, abjuring close factual analysis, gave its imprimatur to this administrative sleight-of-hand.

The court's refusal to engage in substantive review of the relevant evidence compounds its error in enlarging the scope of OSHA's basic authority. Under the court's decision, not only may OSHA impose intrusive standards whenever it perceives a mere "risk" of health impairment, but the agency need not support with any probative evidence its finding of such risk. The decision below therefore opens the door to virtually unchecked regulation of the nation's workplaces.

3. The court of appeals held that OSHA need not determine whether the costs of the standard bear a "reasonable" relationship to its benefits. App. A, *infra,* at 53a. This holding squarely conflicts with the Fifth Circuit's decision in *American Petroleum Institute* v. *OSHA, supra.* In that case, OSHA imposed a standard respecting exposure to benzene without estimating the expected benefits to be achieved. The Fifth Circuit held that, under section 3(8) of the Act, 29 U.S.C. § 652(8), an OSHA standard must be "reasonably necessary" and that, to meet this requirement, OSHA must have a "factual basis" for concluding that "measurable" benefits will inure to workers under the standard. 581 F.2d at 503-04.

In promulgating the cotton dust standard, OSHA expressly declined to analyze or estimate the standard's benefits for employees in any of the affected industries, speculating only that they would be "appreciable." 43 Fed. Reg. at 27379. Explicitly disagreeing with the Fifth Circuit, the court below held that OSHA need not compare costs versus benefits and therefore need not estimate the standard's expected benefits. App. A, *infra,* at 67a.

In point of fact, the record contains no evidence that the standard will result in any benefits for employees in warehouses and classing offices. What the record does establish is that, unlike the situation in the textile industry, neither byssinosis nor chronic respiratory disease has ever been documented in warehouses or classing offices. App. A, *infra,* at 61a. Since no probative evidence supports imposition of a standard on these industries, and since the dust levels in these workplaces are already within the standard's permissible exposure limit, *id.* at 66a, the standard will not produce any benefits, much less any "measurable benefits," to warehouse or classing office workers.[8]

This Court has granted certiorari in *American Petroleum Institute* and the case has been submitted for decision. The decision in that case presumably will resolve the question whether OSHA must make a "rough but educated estimate of the extent of benefits

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[8] Although most firms in the cotton warehouse and cotton classing office industries already comply with the standard's permissible exposure limit, imposition of the standard nevertheless subjects them to substantial burdens. For example, the standard's annualized non-engineering costs may comprise up to 90% of the warehouse industry's after-tax profits. *See* Market Research Service, "Economic Impact of OSHA's Proposed Cotton Dust Standard on Cotton Warehouses," Ex. 95f, J.A. 3019, 3022. Without significant analysis, the court of appeals concluded that the standard nevertheless is economically feasible for warehouses and classing offices. App. A, *infra*, at 67a.

Petitioners in American Textile Manufacturers Institute v. Marshall, No. 79-1429, *petition for cert. filed* March 14, 1980, have requested review, *inter alia,* of the standard used by the court of appeals in evaluating economic feasibility under section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5). Petitioners herein incorporate by reference the arguments with respect to economic feasibility made by petitioners in No. 79-1429.

expected from the standard." 581 F.2d at 504. If this question is answered in the affirmative, the Court should vacate the judgment below and instruct the court of appeals to remand to OSHA so that the agency can determine whether workers in cotton warehouses and classing offices will obtain measurable benefits from enforcement of the cotton dust standard.

CONCLUSION

The petition for a writ of certiorari should be granted.

Respectfully submitted,

NEAL P. GILLEN

1707 L. Street, N.W.
Suite 460
Washington, D.C. 20007
(202) 296-7116

Counsel for the American Cotton Shippers Association

CARL W. VOGT
KEITH A. JONES
JOYCE E. REBACK

FULBRIGHT & JAWORSKI
1150 Connecticut Ave., N.W.
Suite 400
Washington, D.C. 20036
(202) 452-6800

Counsel for the Cotton Warehouse Association

APPENDIX

Notice: This opinion is subject to formal revision before publication in the Federal Reporter or U.S.App.D.C. Reports. Users are requested to notify the Clerk of any formal errors in order that corrections may be made before the bound volumes go to press.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 78-1562

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, *et al.*, PETITIONERS

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, *et al.*, RESPONDENTS

No. 78-1736

COTTON WAREHOUSE ASSOCIATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, U.S. DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, U.S. DEPARTMENT OF LABOR

Bills of costs must be filed within 14 days after entry of judgment. The court looks with disfavor upon motions to file bills of costs out of time.

No. 78-1979

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS; INDUSTRIAL UNION DEPARTMENT, AFL-CIO; AND AMALGAMATED CLOTHING AND TEXTILE WORKERS UNION, AFL-CIO, CLC, INTERVENORS

No. 78-1980

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

AFL-CIO, ETC., INTERVENORS

No. 78-1981

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

AFL-CIO, ETC., INTERVENORS

No. 78-1982

MILLIKEN AND COMPANY, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR AND DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, RESPONDENTS

No. 78-1983

ARKWRIGHT MILLS, PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1984

SPARTAN MILLS, PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1986

BLAIR MILLS, INC., PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1987

HERMITAGE, INC., PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1988

DAN RIVER, INC., PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1989

CONE MILLS CORPORATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1990

MAYFAIR MILLS, PETITIONER

v.

F. RAY MARSHALL, SECRETARY, DEPARTMENT OF LABOR, AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, RESPONDENTS

No. 78-1991

SPRINGS MILLS, INC., PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1992

RIEGEL TEXTILE CORPORATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-1993

FIELDCREST MILLS, INC., PETITIONER

v.

F. RAY MARSHALL, SECRETARY OF LABOR, AND DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR FOR OCCUPATIONAL SAFETY AND HEALTH, AND THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2013

AMERICAN COTTON SHIPPERS ASSOCIATION, PETITIONER

v.

DR. EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, AND OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2014

NATIONAL COTTONSEED PRODUCTS ASSOCIATION, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR AND EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2016

NATIONAL COTTON COUNCIL OF AMERICA, PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR, EULA BINGHAM, ASSISTANT SECRETARY OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, UNITED STATES DEPARTMENT OF LABOR, RESPONDENTS

No. 78-2018

WEST POINT-PEPPERELL, INC., PETITIONER

v.

RAY MARSHALL, SECRETARY OF LABOR AND
EULA BINGHAM, ASSISTANT SECRETARY OF LABOR,
RESPONDENTS

Argued February 14, 1979

Decided October 24, 1979

George H. Cohen with whom *Robert M. Weinberg, Jeremiah A. Collins, David M. Silberman, Laurence Gold, Judith Kincaid, J. Albert Woll, Elliot Bredhoff* and *Arthur M. Goldberg* were on the brief, for AFL-CIO, et al. petitioner in No. 78-1562, and intervenors in Nos. 78-1979, 78-1980 and 78-1981.

Robert E. Payne with whom *John S. Battle, Jr., Gregory B. Tobin, Edward W. Warren* and *Arthur F. Sampson III* were on the brief, for petitioners American Textile Manufacturers Institute, Inc., et al. in Nos. 78-1562, 78-1979, 78-1980, 78-1981 and 78-1993.

Harlan H. Huntley and *Roger L. Tuttle* were on the brief, for petitioner Dan River, Inc. in No. 78-1988.

Robert T. Thompson with whom *Gary S. Klein* was on the brief, for petitioner Milliken and Company in Nos. 78-1982, 78-1986 and 78-1987.

Samuel K. Abrams and *Brian E. Moran* were on the brief, for petitioner Cone Mills Corp. in No. 78-1989.

Before BAZELON, *Senior Circuit Judge*, and TAMM and ROBINSON, *Circuit Judges.*

Opinion for the Court filed by *Senior Circuit Judge* BAZELON.

BAZELON, *Senior Circuit Judge*: These consolidated petitions [1] for review challenge a new permanent health standard limiting occupational exposure to cotton dust,[2] which was promulgated by regulation on June 19, 1978 by the Occupational Safety and Health Administration of the Department of Labor (OSHA), under section 6(b)(5) of the Occupational Safety and Health Act of 1970 (the Act).[3] OSHA's action, which rests on its determination that occupational exposure to cotton dust presents a material health hazard to workers, is attacked by

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[1] Petitions in addition to those on review here, *see* notes 4-6, *infra*, were filed by representatives of the cotton waste processing industries and users of cotton batting: the National Association of Bedding Manufacturers (No. 78-1784); the National Association of Furniture Manufacturers (No. 78-1796); the Textile Fibers and By-Products Association (No. 78-1985); the National Cotton Batting Institute (No. 78-2015); and, the Wolf Corporation (No. 78-2017). These petitioners were severed from this case on November 1, 1978, when OSHA suspended application of the standard to these industries. *See* 43 Fed. Reg. 38087 (1978); 44 Fed. Reg. 5438 (1979).

[2] Standard for Occupational Exposure to Cotton Dust, 43 Fed. Reg. 27350-99 (June 19, 1978), as amended, 43 Fed. Reg. 28473-74 (June 30, 1978), 43 Fed. Reg. 35032-35 (August 8, 1978), 43 Fed. Reg. 56893-94 (December 5, 1978) [hereinafter "the standard"].

[3] 83 Stat. 1594, 29 U.S.C. § 655(b) (1976). The Secretary of Labor delegated his authority to promulgate occupational safety and health standards under 29 U.S.C. § 655 (1976) to the Assistant Secretary of Labor of Occupational Safety and Health ("the Secretary"), who is the chief executive officer of OSHA. References in this opinion to "the Secretary" and "OSHA" are used interchangeably.

three groups of petitioners: (1) representatives of the cotton textile industry[4] and (2) nontextile industries[5] who claim that the standard is unwarranted and infeasible; and (3) their employee unions, who attack two provisions of the standard as too lax, but support the rest.[6] These very divergent claims reflect the wide variety of conflicting interests that make OSHA's task a difficult one. On direct review,[7] we uphold the standard except for its application to the cottonseed oil industry which we remand for clarification or reconsideration.

To assist a proper understanding of the issues, we discuss (I) the history and context of the agency's action; (II) the nature of our review under the Act; (III) the

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[4] The textile industry petitioners include the American Textile Manufacturers Institute, Inc. (ATMI) (Nos. 78-1979, 78-1980, and 78-1981) and twelve individual companies engaged in the manufacture of textiles from cotton: Milliken and Company (No. 78-1982); Arkwright Mills (No. 78-1983); Spartan Mills (No. 78-1984); Blair Mills, Inc. (No. 78-1986); Hermitage, Inc. (No. 78-1987); Dan River, Inc. (No. 78-1988); Cone Mills Corp. (No. 78-1989); Mayfair Mills (No. 78-1990); Springs Mills, Inc. (No. 78-1991); Riegel Textile Corp. (No. 78-1992); Fieldcrest Mills, Inc. (No. 78-1993); and West Point-Pepperell, Inc. (No. 78-2018).

[5] The non-textile industries are represented by the National Cottonseed Products Association (No. 78-2014), the American Cotton Shippers Association (No. 78-2013), and the Cotton Warehouse Association (No. 78-1736). A petition also was filed on behalf of the entire cotton industry of the National Cotton Council of American (NCCA) (No. 78-2016).

[6] The employee unions are represented by the American Federation of Labor & Congress of Industrial Organizations (AFL-CIO), its Industrial Union Department, and their affiliate, the Amalgamated Clothing and Textile Workers Union (the unions) (No. 78-1562).

[7] The Act permits any person adversely affected by a health and safety standard to challenge its validity in the courts of appeals. 29 U.S.C. § 655(f) (1976).

claims of the textile industry; (IV) the claims of the non-textile industries; and (V) challenges to a few technical provisions of the standard.

I. Background

A. *Health Risks*

Health impairments associated with exposure to cotton dust range from acute but reversible reactions to irreversible, chronic obstructive pulmonary disease.[8] Cotton dust exposure can produce or aggravate respiratory symptoms characteristic of chronic bronchitis, asthma, and emphysema.[9] Further, a specific, debilitating disease has been conclusively attributed to the effect of cotton dust on the respiratory passages. This disease, named byssinosis, is more commonly known in its chronic stage as "brown lung disease."[10] This is the most serious health hazard for cotton workers.

Although the prevalence of the disease among cotton workers has been known for centuries,[11] its exact etiology

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[8] 43 Fed. Reg. 27352, 37354 (1978).

[9] 41 Fed. Reg. 56500 (1976); 43 Fed. Reg. 27352-54 (1978).

[10] OSHA observed that "byssinosis represents a constellation of respiratory effects." 43 Fed. Reg. 27353 (1978) (citations omitted).

[11] In 1705, the Italian Bernardino Ramazzi wrote that

> those who hackle in the flax and hemp to prepare it for being spun and wove, afford frequent instances of the unwholesomeness of their trade; for there flies out of this matter a foul mischeivous powder, that entering the lungs by the mouth and throat, causes continual coughs and gradually makes way for an asthma. . . . But in the long run if they find their affliction grows upon them they must look out for another trade; for 'tis a sordid profit that's accompanied with the destruction of health.

B. Ramazzini, A Treatise of the Diseases of Tradesmen (London, 1705) (quoted in J. Merchant, *Epidemological*

is still not completely understood.[12] The subjective nature of many early symptoms[13] and variations in the composition of cotton dust[14] have compounded the uncer-

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Studies of Respiratory Disease Among Cotton Textile Workers: 1970-1973 at 1 (1973), Joint Appendix (J.A.) (1497). *See also* 41 Fed. Reg. 56500 (1976).

[12] *E.g.*, 43 Fed. Reg. 27352 (1978); Bouhuys, Breathing Physiology, Environment and Lung, Disease, 418-25 9, J.A. 288-95.

[13] A major technique for diagnosing byssinosis is to ask individuals about their symptoms. A. Bouhuys, Byssinosis in the United States, 14-15, J.A. 230-31; S. Roach & R. Schilling, *A Clinical and Environmental Study of Byssinosis in the Lancashire Cotton Industry*, 17 BRIT. J. INDUS. MED. 1-3 (1959), J.A. 201-203. Workers who fear losing their jobs upon signs of ill-health or whose language facilities impair their ability to answer questions about their symptoms may not accurately report their health impairments.

Other workers may experience severe symptoms and yet not be diagnosed with the disease. *Compare, e.g.*, J.A. 2120 (testimony of Eva Bradshaw) ("Along about 5 or 10 years before I had to come out of the mill my chest would get so tight it felt just like an accordian that had closed down, like it was squeezed shut as tight as it would go. I coughed all the time, especially at work.") *with* J.A. 2057-58 (supplemental submission of Harold Imbus of Burlington Industries) (asserting that physicians did not diagnose Eva Bradshaw with byssinosis).

[14] The composition of cotton dust varies in different industries, plants, and stages of manufacturing. NIOSH, Criteria for a Recommended Standard: Occupational Exposure to Cotton Dust 86-90 (1974), J.A. 98-102. NIOSH noted that recent epidemological and expimental evidence suggests that the substances causing byssinosis is some unknown biologically active material carried with the inorganic dust into the lungs of exposed workers. *Id.* at 96, J.A. at 108. But NIOSH concluded that insufficient information is available to support this theory. *Id. accord.*, J.A. 1216-17 (comments of A. Bouhuys).

[Continued]

tainties about the actual way in which cotton dust exposure causes serious health impairments.[15] Nonetheless, its progressively disabling symptoms are well documented.[16]

Typically, a person suffering from byssinosis is initially affected by irritated air passages, coughing, breathlessness, and chest tightness. These symptoms are often accompanied by decreased pulmonary functioning, evidenced by objective indicators. At first the symptoms tend to last briefly, and usually remit a few days after exposure. The symptoms recur, however, whenever an affected individual returns to a dusty environment.

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[14] [Continued]

Therefore, OSHA applied its standard to a broad definition of cotton dust. 43 Fed. Reg. 27354. *See id.* at 27395, (to be codified at 29 C.F.R. 1910.1043(b)):

> "Cotton dust" means dust present in the air during the handling or processing of cotton, which may contain a mixture of many substances, including ground up plant matter, fiber, bacteria, fungi, soil, pesticides, non-cotton plant matter and other contaminants which may have accumulated with the cotton during the growing, harvesting and subsequent processing or storage periods. Any dust present during the handling and processing of cotton through the weaving or knitting of fabrics, and dust present in other operations or manufacturing processes using new or waste cotton fibers or cotton fiber by-products from textile mills are considered cotton dust.

[15] *E.g.*, J.A. 1214 (statement of A. Bouhuys); J.A. 317 (Hygiene Standards for Cotton Dust, British Occupational Hygiene Society Committee on Hygiene Standards); J.A. 339 (R. Schilling, Byssinosis in Cotton and Other Textile Workers). *See* 43 Fed. Reg. 27355 (citing more studies).

[16] NIOSH, Criteria for a Recommended Standard: Occupational Exposure to Cotton Dust 23-36 (1974), J.A. 33-46 (citing studies); R. Nader, *The Cotton-Mill Killer*, THE NATION (March 15, 1971), J.A. 2435. The description of the disease that follows in text relies on these reports.

As the disease progresses, its symptoms become more pronounced and painful, resembling the effects of bronchitis and asthma. They persist throughout the work week, or period of exposure. During this stage, an affected worker may become temporarily incapacitated and may need to take short but frequent leaves from work.

When byssinosis reaches its advanced stage, the worker exhibits the symptoms of emphysema and chronic bronchitis. Ultimately, irreversible lung damage results. A worker afflicted with chronic byssinosis is forced into premature retirement, often after painful efforts to remain on the job. Such individuals must give up all activities that require any physical exertion. The permanent lung damage caused by byssinosis makes every breath painful and difficult. The excess strain these breathing difficulties place on the heart often leads to the worker's early death from heart failure.

The actual number of persons afflicted with byssinosis is not certain, but it is large. One study estimated that 35,000 people have "disabling loss of lung function related to their work in the cotton textile industry" alone.[17] The Senate Report on the Occupational Safety and Health Act stated that as many as 100,000 active or retired workers suffered from the disease in 1970.[18]

Studies in the record estimate that 250,000 to 800,000 workers are exposed daily to cotton dust and its attend-

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[17] J.A. 1214 (statement of A. Bouhuys); *see* A. Bouhuys, *et. al*, Epidemiology of Chronic Lung Disease in a Cotton Mill Community, J.A. 3165.

[18] 91st Cong., 2d Sess. 3 (1970), *reprinted in* S. REP. No. 91-1282, LEGISLATIVE HISTORY OF THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, at 143 (1971) [hereinafter cited as LEGIS. HIST.].

ant risks.[19] As the reported incidence of the disease usually ranges as high as 20-30% of the work force in cotton industries,[20] each worker faces a substantial risk of health impairment.[21]

B. *History of Cotton Dust Regulation*

Prior to the creation of OSHA, a private association of governmental industrial hygienists placed cotton dust on its tentative list of substances for which specific exposure limits should be established.[22] In 1966 this organization adopted a "threshold limit value" of 1000 micrograms per cubic meter (1000 $\mu g/m^3$) of total dust.[23]

The federal government first regulated cotton dust in 1968. At that time, the Secretary of Labor, acting pursuant to the Walsh-Healey Act,[24] promulgated a 1000 $\mu g/m^3$ maximum total dust exposure as an occupational health requirement for public contractors.[25]

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[19] R. NADER, *supra* note 17, J.A. 2435 (estimating 250,000 textile workers exposed); Statement of Sidney M. Wolfe and Peter Greene, Public Citizen's Health Research Group, J.A. 3137 (estimating 800,000 cotton workers exposed).

[20] *See, e.g.*, J.A. 230 (20%-30% of people in carding rooms of textile mills affected with byssinosis) (A. Bouhuys, Byssinosis in the United States); J.A. 241 (20% of workings in preparation area of textile plant exhibit byssinosis symptoms) (J. Merchant, *et. al.*, Byssinosis and Chronic Bronchitis Among Cotton Textile Workers).

[21] The actual risk may vary according to the nature of the cotton dust and the extent of an individual's exposure.

[22] 43 Fed. Reg. 27351 (1978) (describing American Conference of Governmental Industrial Hygienists).

[23] *Id.*

[24] 41 U.S.C. § 35(e) (1976). *See* 43 Fed. Reg. 27351 (1978).

[25] The 1000 $\mu g/m^3$ total dust standard was based on a study that was published in 1960. Conducted by Roach and Schilling, the study examined cotton mills in Lancaster England. This study is reprinted in the Joint Appendix (J.A. at 201.

This was an interim standard adopted upon passage of the Act in 1970 in which section 6(a) required the Secretary immediately to promulgate as occupational safety or health standards all existing "established Federal Standards," including the 1000 $\mu g/m^3$ standard for cotton exposure.[26] These interim standards were intended to afford workers minimal protection until the adoption of permanent standards through OSHA's rulemaking proceedings.

On September 26, 1974, the Director of the National Institute of Occupational Safety and Health (NIOSH)[27] submitted to the Secretary of Labor a set of recommendations for regulating cotton dust. NIOSH recommended[28]

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[26] 29 U.S.C. § 655(a) (1976). *See also* 29 U.S.C. § 652(10) (1976). Congressional concern over delays in regulating cotton dust was manifest in the legislative history of the Occupational Safety and Health Act of 1970:

> "despite repeated warning over the years from other countries that their cotton workers suffered from lung disease, it is only within the past decade that we have recognized byssinosis as a distinct occupational disease among workers in American cotton mills." S. REP. No. 91-1282, 91st Cong., 2d Sess. 3 (1971), *reprinted in* LEGIS. HIST. 143.

[27] 29 U.S.C. § 671 (1976), establishes NIOSH within the Department of Health, Education, and Welfare as a national institute to "develop . . . recommended occupational safety and health standards." NIOSH's director is authorized, on his own initiative or at the request of the Secretary of Labor or the Secretary of Health, Education, and Welfare,

> to conduct such research and experimental programs as he determines are necessary for the development of criteria for new and improved occupational safety and health standards[.]

29 U.S.C. § 671(d)(1).

[28] Criteria Document: Recommendations for an Occupational Exposure Standard for Cotton Dust, J.A. 1-169.

that cotton dust exposure be "controlled to the lowest feasible limit which shall be less than 0.2 mg lint-free cotton dust/cu.m.," [29] or 200 $\mu g/m^3$.

Shortly thereafter, OSHA published an Advanced Notice of Proposed Rulemaking on cotton dust. OSHA requested interested parties to submit their views on the NIOSH recommendations and related issues concerning a proposed standard.[30] OSHA received comments from scientists, labor unions, industries, cotton growers, and governmental representatives. A proposed revision, published on December 28, 1976, called for an exposure limit of 200 $\mu g/m^3$ of cotton dust.[31] OSHA provided 90 days for interested parties to submit written comments.[32]

At the close of the comment period, OSHA conducted hearings in three cities for a total of 14 days.[33] The comments and exhibits received before the hearings, the written and oral testimony of the hearing participants, and post-hearing comments and briefs comprise the informal rulemaking record for the final cotton dust standard promulgated by the agency. This record exceeds 105,000 pages in length; it includes comments from 263 parties and testimony from 109 participants at the hear-

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[29] J.A. 1974. *See also* 41 Fed. Reg. 565000 (1976).

[30] 39 Fed. Reg. 44769 (1974). The Advance Notice requested interested parties to submit written data, views, and arguments concerning "whether a new standard . . . should be issued on the basis of the [NIOSH] criteria or any other information" and on the contents of a proposed standard. *Id.*

[31] 41 Fed. Reg. 56498 (1967), J.A. 171.

[32] *Id.* at 56515, J.A. at 188.

[33] The hearing was conducted in Washington, D.C. on April 5-8, May 2-6, and May 16-17; in Greenville, Mississippi, on April 12; and in Lubbock, Texas, on May 10-12, 1977.

ing. The Final Standard and its accompanying statement of reasons fill 68 pages of the Federal Register.[34]

C. *The OSHA Standard*

On the basis of the massive rulemaking record, OSHA promulgated the cotton standard in an effort to reduce the health risks to cotton workers.[35] Part of the standard sets "permissible exposure limits" (PELs) for each manufacturing operation and industry that exposes workers to cotton dust.[36] Thus, OSHA set (1) 200 micrograms

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[34] 43 Fed. Reg. 27350 (1978) (to be codified as 29 C.F.R. § 1910.1043(b)).

[35] *See* 43 Fed. Reg. 27394-418 (1978) (to be codified at 29 C.F.R. § 1910.1043). This is the first standard promulgated under § 6(b)(5) of the Act that does not involve a suspected carcinogen. Earlier standards were adopted for coke oven emissions, such as asbestos dust, *see* 29 C.F.R. § 1910.93a (1978).

Section 3(8) of the Act, 29 U.S.C. § 652(8) defines the term "occupational safety and health standard" to mean

> a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.

The Act requires employers to "comply with occupational safety and health standards promulgated" under the Act, 29 U.S.C. § 654(a)(2), in addition to their general duty to furnish employment and a place of employment "free from recognized hazards that are causing or are likely to cause death or serious physical harm . . . ." 29 U.S.C. § 654(a)(1).

[36] The proposed and final standards both set limits for exposure to cotton dust particles that are both lint-free and small enough to be breathed. These respirable particles can be measured in microns over a given time period. Relying on what it found to be "the most persuasive testimony" in the record, OSHA used a 15-micron cut-off point to separate

per cubic meter (200 $\mu g/m^3$) as the PEL for lint-free respirable cotton dust in yarn manufacturing; (2) 750 $\mu g/m^3$ for slashing and weaving operations in the cotton industry; and (3) 500 $\mu g/m^3$ for all other processes in the cotton industry and for all non-textile industries that expose workers to cotton dust.[37]

Implementation of the standard depends primarily on the adoption of engineering and work practice controls by employers. OSHA established a four-year implementation period during which employers are expected to achieve compliance. If an employer establishes that the required controls are infeasible, he can obtain an administrative variance from the standard,[38] but he must make respirators available to protect his employees until he achieves compliance.[39] The standard also requires em-

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respirable from non-respirable particles. 43 Fed. Reg. 27355 (1978). Once this cut-off size was determined, the rulemaking participants agreed that the verticle elutriator, a machine that screens airborne particles, is the best sampling device currently available. It separates particles larger than 15 microns from the remaining, "respirable" portion of dust. *Id.* at 27382-84. The verticle elutriator cotton sampling device eliminated from the sample all non-respirable particles, including cotton fly and lint fibers. *See* J.A. 129. In its final standard, OSHA designated the verticle elutriator "or a method of equivelent accuracy and precision" as the means for measuring dust levels, averaged over an eight-hour period. 43 Fed. Reg. 27395 (1978) (to be codified at 29 C.F.R. § 1910.43(c)). Also specified that the measuring devices "should operate at a flow rate of 7.4±0.2. liters per minute. *Id.* at 27398 (sampling equipment).

[37] *Id.* at 27395 (to be codified at 29 C.F.R. § 1910.1043(c)).

[38] *See* 43 Fed. Reg. 27395 (1978) (§ 1910.1043(e) of the standard); 29 U.S.C. §§ 655(b)(6)(A) (1976) (variance procedures). *See* text at note 235 *infra.*

[39] 43 Fed. Reg. 27396 (1978) (§ 1910.1043(f) of the standard); *id.* at 27386.

ployers to monitor employees' exposure to cotton dust, to provide medical surveillance and employee education, and to post warning signs about the health risks.

Before examining petitioners' objections, we consider the limits of our review.

II. Scope of Review

The Occupational Safety and Health Act of 1970 is one of a number of recent Congressional statutes that designates the stringent "substantial evidence" test for judicial review of notice-and-comment rulemaking.[40] The explicit language of the Act,[41] its legislative history,[42] and its application by the courts[43] confirm that regula-

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[40] *See* Federal Trade Commission Improvement Act of 1974, 15 U.S.C. § 57a(4)(3)(A) (1976); Consumer Product Safety Act, 15 U.S.C. § 2060(c) (1976); Toxic Substances Control Act, 15 U.S.C. § 2618(C)(1)(B)(i) (1976).

[41] The OSH Act, § 6(b)(5), 29 U.S.C. § 655(f) (1976), assigns the scope of review for any challenge to a standard issued under § 6 of the Act, 29 U.S.C. § 655:

> The determinations of the Secretary shall be conclusive if supported by substantial evidence in the record considered as a whole.

[42] H. Rep. No. 91-1765, 91st Cong., 2d Sess. 36 (1970) (Statement of the Managers on the Part of the House), *reprinted in* Legis. History at 1189. *See* Assoc. Indus. v. Dep't of Labor, 487 F.2d 342, 348-49 (2d Cir. 1973) (Friendly, J.) (discussing legislative history).

[43] In Industrial Union Dep't v. Hodgson, 499 F.2d 467 (D.C. Cir. 1974), this court rejected the claim that the substantial evidence test adopted in the Act should apply only to factual determinations. This view would leave policy judgments behind a challenged health and safety standard reviewable only under the arbitrary and capricious test. 499 F.2d at 473. Instead, this court concluded that under the Act, policy inferences along with factual determinations must not escape "exacting scrutiny" even though inferences cannot be strictly verified. *Id.* at 475. *See also* Assoc. Indus. v. Dep't of Labor, 487 F.2d 342, 349 (2d Cir. 1973).

tions promulgated under the Act are to be upheld on review if supported by "substantial evidence on the record considered as a whole." [44]

The substantial evidence test provides for more rigorous scrutiny than the usual "arbitrary and capricious" [45] test applicable to informal rulemaking.[46] Although Congress required this more rigorous judicial review, it nevertheless delegated unusually broad discretionary au-

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[44] 29 U.S.C. § 655(f) (1976). The requirement of substantial evidence "on the record considered as a whole" means that reviewing courts must take into account not just evidence that supports the agency's decision, but also countervailing evidence. Universal Camera Corp. v. NLRB, 340 U.S. 474, 481-82 (1951). Yet this requirement does not alter the court's fundamental duty to uphold the agency's "choice between two fairly conflicting views, even though the court would justifiably have made a different choice had the matter been before it *de novo*." *Id.* at 488.

[45] See Administrative Procedure Act, 5 U.S.C. § 706(2)(A) (1976). Until the last decade, this was the standard of review typically applied to informal rulemaking. *See* K. DAVIS, 1 ADMINISTRATIVE LAW TREATISE § 6.6 (1978). It remains as a basic standard of review, along with other criteria of legality and constitutionality, even when the substantial evidence test applies. *E.g.*, May Trucking Co. v. United States and ICC, 593 F.2d 1349, 1352 (D.C. Cir. 1979).

[46] In application, however, the lines between the two tests are far from clear. In Citizens to Preserve Overton Park, 401 U.S. 402, 415-16 (1971), the Supreme Court held that review of informal agency action must be "thorough, probing, in-depth" and "searching and careful"—even where the substantial evidence test does not apply. This court concluded in Greater Boston Telephone Corp. v. FCC, 444 F.2d 841, 852 (D.C. Cir. 1970), that even in reviewing agency adjudication, the essential requirement is reasoned decision making. *See generally* Assoc. Indus. v. Dep't of Labor, 487 F.2d 341, 349-50 (2d Cir. 1973) (convergence between "substantial evidence" and "arbitrary or capricious" criteria).

thority to regulate against possible harms.[47] We have already resolved this seeming anomoly in *Industrial Union Dep't v. Hodgson*, 499 F.2d 467 (D.C. Cir. 1974). There we concluded that the reviewing court's task under the Act is to provide a careful check on the agency's determinations without substituting its judgment for that of the agency.[48] Congress apparently created an "uneasy partnership" between the agency and the reviewing court[49] to check extravagant exercises of the agency's

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[47] The substantial evidence test was adopted in the Act apparently as a compromise when the House relinquished its advocacy of formal agency proceedings and adopted the Senate's informal rulemaking provision. *See* H. REP. No. 91-1765. 91st Cong., 2d Sess. 36 (1970), *reprinted in* LEGIS. HIST. at 1189. *See also* Industrial Union Dep't v. Hodgson, 499 F.2d at 473; Assoc. Indus. v. Dep't of Labor, 487 F.2d at 348-49 (discussing legislative history of scope of review provision).

[48] In *Industrial Union Dep't v. Hodgson*, this court construed the substantial evidence review in terms of the demands to be made by the reviewing court:

> What we are entitled to at all events is a careful identification by the Secretary, when his proposed standards are challenged, of the reasons why he chooses to follow one course rather than another. Where that choice purports to be based on the existence of certain determinable facts, the Secretary must, in form as well as substance, find those facts from evidence in the record. By the same token, when the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found persuasive.

499 F.2d at 475-76.

[49] Assoc. Indus. v. Dep't of Labor at 354. This partnership is uncomfortable for the courts chiefly because the record produced by informal rulemaking is not easily suited to close judicial scrutiny. *See* Florida Growers Ass'n v. Dep't of Labor, 489 F.2d 120, 129 (5th Cir. 1974). The record generally is a compendium of letters, studies, reports, and statements, untested by the adversary process. Reflecting the

authority to regulate risk.[50] Our role in this partnership is to ensure that the regulations resulted from a process of reasoned decisionmaking consistent with the agency's mandate from Congress.[51] By statute, this process must include notice to interested parties of issues presented in the proposed rule.[52] The agency must also provide opportunities for these parties to offer contrary evidence and arguments.[53]

OSHA adopted additional procedures to improve its decisionmaking process.[54] A qualified hearing examiner

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legislative nature of informal rulemaking, the record often does not even display the full range of considerations before the agency when the decision was made. Pedersen, *Formal Records and Informal Rulemaking*, 85 YALE L.J. 38, 62 (1975). Furthermore, the decision necessarily rests on policy considerations authorized by the agency's mandate. Judicial review of such considerations cannot be identical to review of factual determinations.

[50] Congress wanted the Secretary to protect workers not only against known harms, but also against risks of harms not entirely understood. *See, e.g.*, S. REP. No. 91-1282, 91st Cong., 2d Sess. 4 (1970), *reprinted in* LEGIS. HIST. at 144 (discussing need to regulate organophosphates and chlorinated hydrocarbons).

[51] Universal Camera v. NLRB, *supra* at 488; Ethyl Corp. v. EPA, 541 F.2d 1, 34 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976).

[52] 29 U.S.C. §§ 655(b) (2), (3) (1976).

[53] *Id.*

[54] The OSH Act requires the Secretary to follow these procedures in promulgating health and safety standards under § 655 of the Act:

1) publication of the proposed rule in the Federal Register, § 655(b) (2);

[Continued]

must preside at oral hearings on proposed standards. A verbatim transcript of the hearing is required, and cross-examination is permitted. These procedures, which were followed in this case, transform OSHA's action into "hybrid" rulemaking,[55] and produce a record more susceptible to rigorous judicial review than the more usual informal rulemaking record.[56]

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[54] [Continued]

2) opportunity for interested parties to submit "written data or comments" within thirty days after publication of the proposed rule, § 655(b)(2);

3) opportunity for interested parties to submit "written objections to the proposed rule . . . and request[] a public hearing on such objections," § 655(b)(3);

4) publication in the Federal Register of time and place for hearing scheduled on objections to proposed standard, § 655(b)(3); and

5) promulgation of final rule, or decision not to issue one, within sixty days after period permitted for written comments, or within sixty days after completion of hearing, § 655(b)(4).

These provisions add to the minimal procedures required by the APA, 5 U.S.C. § 553 (1976).

The agency also requires that all relevant information, including submissions and testimony, must be considered in formulating the final standard. 29 C.F.R. § 1911.18(a)(1) (1978). The statement of basis and purpose for the final standard must describe "the significant issues which have been faced, and . . . the rationale for their solution." 29 C.F.R. § 1911.18(b) (1978).

[55] *See* K. DAVIS, 1 ADMINISTRATIVE LAW TREATISE, 453 (1978).

[56] In describing the additional procedures, the agency noted "a congressional expectation that the rulemaking would be on the basis of a record "to which a substantial evidence test, where pertinent, may be applied." 29 C.F.R. § 1911.15(a) (1978).

The tasks of this reviewing court are thus to ensure that the agency has (1) acted within the scope of its authority;[57] (2) followed the procedures required by statute and by its own regulations;[58] (3) explicated the bases for its decision; (4) adduced substantial evidence in the record to support its determinations.[59]

The meaning of "substantial evidence" in this context is problematic. Factual proof about particular health risks may not be substantial in the traditional sense simply because the medical and scientific communities do not yet completely understand the nature of threatening diseases. To protect workers from material health impairments, OSHA must rely on predictions of possible future events and extrapolations from limited data. It may have to fill gaps in knowledge with policy considerations. Congress recognized this problem by authorizing the agency to promulgate rules on the basis of the "best available evidence."[60] OSHA's mandate necessarily requires it to act—even if information is incomplete—

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[57] Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 415 (1971); City of Chicago v. FPC, 458 F.2d 731, 745 (D.C. Cir. 1971); Automotive Parts & Accessories Ass'n v. Boyd, 407 F.2d 330, 343 (D.C. Cir. 1968); 5 U.S.C. § 706(a)(C) (1976).

[58] Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 417 (1971); Friends of the Earth v. United States Atomic Energy Comm'n, 485 F.2d 1031, 1033 (D.C. Cir. 1973); 5 U.S.C. § 706(2)(D) (1976).

[59] *See* note 2 *supra*. We have also described these three elements as review of (1) the agency's interpretation of its authorizing statute; (2) procedural integrity; and (3) the substantive basis for the agency's decision. Weyerhaeuser Co. v. Costle, 590 F.2d 1011, 1024-28 (D.C. Cir. 1978).

[60] 29 U.S.C. § 655(b)(5) (1976). The best available evidence in an area of changing technology and incomplete scientific data may leave gaps in knowledge that require policy judgments in constructing the health and safety standard. In

when the best available evidence indicates a serious threat to the health of workers.[61] Thus, a court entrusted with the rigorous "substantial evidence" review must examine not only OSHA's factual support, but also the "judgment calls" and reasoning that contribute to its final decision.[62] Otherwise, an agency's claim of ignorance would clothe it with unreviewable discretion.

Therefore, the reviewing court must examine both factual evidence and the agency's policy considerations set forth in the record. To facilitate this review of the record, the agency must pinpoint the factual evidence and the policy considerations upon which it relied.[63]. This requires explication of the assumptions underlying predictions or extrapolations,[64] and of the basis for its

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recent statutes Congress has defined "evidence" to mean "any matter in the rulemaking record." *E.g.*, Toxic Substances Control Act, 15 U.S.C. § 2618(c) (1) (B) (1976).

[61] 29 U.S.C. § 655(b) (5) (1976). A suit was filed in 1975 charging unlawful delay in modification of the then-existing standard. Amalgamated Clothing & Textile Workers Union, et al. v. Secretary of Labor, No. 75-2157 (D.C., filed Dec. 24, 1975).

[62] 499 F.2d at 475; 487 F.2d at 348.

[63] *See* SEC v. Chenery Corp., 318 U.S. 80, 87 (1943).

[64] With regard to environmental rulemaking, this court held that

> Where a statute is precautionary in nature, the evidence difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, the regulations designed to protect the public health, and the decision that of an expert administrator, we will not demand rigorous step-by-step proof of cause and effect. Such proof may be impossible to obtain if the precautionary purpose of the statute is to be served. . . . The Administrator may apply his expertise to draw conclusion from suspected, but not completely substantiated, relationships

resolution of conflicts and ambiguities.[65] In enforcing these requirements, the court does not reach out to resolve controversies over technical data.[66] Instead, it seeks to ensure public accountability. Explicit explanation for the basis of the agency's decision not only facilitates proper judicial review but also provides the opportunity for effective peer review, legislative oversight, and public

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between facts, from trends among facts, from probative preliminary data not yet certifiable as 'fact,' and the like.

Ethyl Corp. v. EPA, 541 F.2d 1, 28 (D.C. Cir. 1976) (citations omitted). *See* Amoco Oil Co. v. EPA, 501 F.2d 722, 740-41 (D.C. Cir. 1974) (reasons and explanations, but not findings, required for predictions used in risk regulation).

[65] [W]hen the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found persuasive.

499 F.2d at 476.

[66] *See* Ethyl Corp. v. EPA, 541 F.2d 1, 67 (D.C. Cir. 1976) (Bazelon, C.J., and McGowan, J., concurring); Internat'l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 652 (D.C. Cir. 1973) (Bazelon, C.J., concurring in result). From their stance outside of both scientific and political debates, courts can help to ensure that decisionmakers articulate the basis for their decisions. But once courts step beyond that role and endeavor to judge the merits of competing expert views, they leave the terrain they know. In so doing, the judiciary may mislead the public into believing it provides an expert check on decisions that in fact it does not fully comprehend.

Thus, a court applying the substantial evidence test to a numerical standard considers "whether the agency's numbers are within a 'zone of reasonableness,' not whether its numbers are precisely right." Hercules, Inc. v. EPA, 598 F.2d 91, 107 (D.C. Cir. 1978). Similarly, the possibility of drawing two inconsistent conclusions from the evidence does not prevent an administrative agency's finding from being supported by substantial evidence. Environmental Defense Fund v. EPA, 510 F.2d 1292, 1298 (D.C. Cir. 1975); *accord* Bayside Enterprises, Inc. v. NLRB, 429 U.S. 248, 302 (1976).

education. This requirement is in the best interest of everyone, including the decisionmakers themselves. If the decisionmaking process is open and candid, it will inspire more confidence in those who are affected. Further, by opening the process to public scrutiny and criticism, we reduce the risk that important information will be overlooked or ignored. Instructed by these ends, this court on review will "combine supervision with restraint." [67]

III. Challenges By the Textile Industry

The textile industry petitioners acknowledge that textile workers who are exposed to cotton dust may risk contracting byssinosis.[68] Their challenge focuses on the regulatory approach OSHA has chosen to reduce that risk. Specifically, they ask us to find that OSHA's regulatory approach is not "reasonably necessary" to protect textile workers from the admitted danger posed by cotton dust.[69] Further, they ask us to find that approach technologically and economically infeasible.[70]

A. *Challenge to the Regulatory Approach*

OSHA chose a "dust control strategy" that requires engineering and work practice controls to limit worker exposure to the "lowest feasible [cotton] dust levels" within four years.[71]

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[67] Public Serv. Comm'n v. FPC, 511 F.2d 338, 355 (D.C. Cir. 1975).

[68] *See, e.g.*, Joint Brief Textile Petitioners at 2-3; 8-9 [hereinafter cited as Textile Brief] ("[t]he development of byssinosis has been associated with the inhalation of an unknown element in the dust generated by the handling or processing of cotton"); *id.* at 18 (referring to "the slowly progressive health hazard presented by exposure to 'cototon dust' ").

[69] Textile Brief at 54-65.

[70] *Id.* at 18-20, 29-34, 37-54.

[71] *See* text at notes 37-39.

The textile industry rejects OSHA's approach as unnecessarily expensive. The industry contends that workers can be fully protected from "'*material impairment* of [their] health or functional capacity'" by a higher permissible exposure level coupled with a medical surveillance program.[72] The industry's alternative would permit an exposure level of 500 $\mu g/m^3$ in all cotton manufacturing operations except weaving, for which a PEL of 1000 $\mu g/m^3$ is proposed. This alternative would also require workers to wear respirators or accept transfers to lower exposure work areas if medical surveillance shows that they are suffering from byssinosis symptoms "which, with years of continued exposure, could lead to [material health] impairment."[73]

The textile industry petitioners claim that OSHA failed to seriously consider their alternative or to provide adequate reasons for rejecting it. The industry also claims that the regulatory approach adopted by OSHA is not permitted by the Act.[74] We disagree with both claims.

First, OSHA gave serious attention to the medical studies conducted by the textile industry and proffered to support the industry's alternative.[75] These studies pur-

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[72] *Id.* at 57 (emphasis in original); *id.* at 21.

[73] *Id.* at 21-22. The industry claims that its approach will provide protection comparable to OSHA's strategy in that neither completely eliminates the occurance of early byssinosis symptoms. *Id.* at 16-17.

[74] *Id.* at 54-64.

[75] The industry relies on the following studies: (1) Burlington Industries, Inc., study of 12,519 workers from 1970-1976 (Joint Appendix (J.A.) 2035; (2) West Point-Pepperell, Inc. study of 9,181 workers in 1973 (J.A. 1987, 2005); (3) study by Dr. W.K.C. Morgan of 720 workers (J.A. 2008); (4) study by Dr. Hans Weill, an OSHA witness, with complete data on 418 workers (J.A. 1235, 1240); (5) study by Cone Mills Corporation of 6,631 workers (J.A. 2012). These studies are discussed at length in OSHA's statement of reasons. *See* 43 Fed. Reg. 27355-57 (1978).

port to show that medical surveillance programs at various textile plants have already afforded workers a level of protection comparable to that offered by OSHA's approach. The record shows that OSHA specifically addressed and scrutinized these studies, and concluded that their validity had largely been discredited.[76] OSHA's judgment on

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[76] *See generally,* 43 Fed. Reg. 27355-57. OSHA found the industry studies deficient on many grounds. First, the prevalence of byssinosis reported at the studied mills tended to be low, but these mills had experienced dust reduction *prior to* implementation of medical surveillance. Consequently, the mills studies by the textile industry lacked a necessary precondition—a dust level of at least 500 $\mu g/m^3$—validly to test the industry's contention that their proposal would be as effective as OSHA's lower PELs in reducing the prevalence of byssinosis.

OSHA also identified substantial, unexplained differences between the percentage of workers who reported subjective byssinosis symptoms and the percentage of those showing pulmonary function decrements indicative of the disease. The textile industry refers to workers' subjective health reports but not to the objective, pulmonary function measurements. The Union petitioners note that workers sometimes falsely deny byssinosis symptoms for fear of losing their jobs if their employer learns that their health is impaired. AFL-CIO, American Textile Manufacturers Institute, Inc., *et al.*, Petitioners Reply Brief and Brief in Intervention at 42 n.55 [hereinafter Union Reply Brief].

OSHA also criticized the industry studies on a number of other grounds. 43 Fed. Reg. 27356-57. First, none of the studies had been subjected to peer review through publication in scientific journals. None of them produced dose-response data, that is, data charting medical responses to different dust levels. The populations studied may not be representative of the entire affected population. Finally, the validity of the studies could not be verified because the textile industry declined to furnish the underlying data, and in some cases, failed to produce the authors of the studies for cross-examination at the hearing. Consequently, OSHA concluded that these studies provided insufficient basis for the regulation.

this issue is sufficiently supported on this basis.[77]

Besides this careful treatment of the medical surveillance proposal, OSHA rejected the industry's proposed reliance on job transfers and respirators to protect workers suffering from acute symptoms of byssinosis on the basis of testimony in the record and express policy considerations.[78] The industry was unable to show that job transfers would be available in sufficient number to respond to the likely prevalence of byssinosis in plants with dust levels at the 500 $\mu g/m^3$ proposed by the industry.[79] Further, the agency found uncontradicted testimony in the record that respirators can cause severe physical discomfort and create safety problems of their own.[80] OSHA concluded that the industry's proposal in-

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[77] Our task is not to resolve the controversy over the studies, but to determine if the agency received and fairly responded to challenges. It did so here in its consideration of the industry's studies. Its explicit identification of flaws in the studies can, *inter alia*, alert future participants to the quality of research it seeks as a basis for its regulations.

[78] 43 Fed. Reg. 27384 (1978).

[79] OSHA, relying on dose-response data submitted by Dr. Merchant, found that 25% of the workers exposed to a 500 $\mu g/m^3$ PEL would develop byssinosis. At this prevalence rate, it is doubtful that all of the affected workers could be moved to a low exposure area. *See, e.g.*, Testimony of Dr. Imbus, Medical Director, Burlington Industries (J.A. 3379-80) noting that 10% was the maximum number of workers who could be reassigned through a medical surveillance and job transfer approach).

[80] OSHA carefully explained why it rejected "a control strategy involving principal reliance on respiratory protection[] to reduce the cost of compliance":

> [R]espirators have many disadvantages which preclude primary reliance or co-reliance on respiratory protection on an equal basis with engineering and work practice controls. The many difficulties . . . were enumerated at

appropriately placed the burden of compliance on the employees.[81] On this express policy ground, and on the basis of the evidence in the record, OSHA reasonably rejected these elements in the industry alternative.

Finally, the textile industry argues that the agency's effort to reduce workers' cotton dust exposure to the lowest feasible level is not "reasonably necessary or appropriate." [82] This argument rests on the claim that the agency need not guard against the acute but reversible symptoms of byssinosis because they do not themselves constitute a "material impairment of health." [83] We find

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> the hearing . . . because of difficulties in face fit, it is difficult to know whether the respirator actually provides adequate protection; respirators, by interfering with vision, hearing, and mobility, can cause safety problems; some employees cannot wear respirators because of breathing difficulties.

43 Fed. Reg. 27384 (1978).

[81] *Id.* ("it is not appropriate to place the burden of compliance principally on the employee, as would be the case if respiratory protection were the principal means of reducing employee exposure.").

[82] Textile Brief at 21, 55. "Reasonably necessary or appropriate" is language from the statutory definition of an "occupational safety and health standard." *See* § 652(8) (defining "occupational safety and health standard" as requiring conditions or practices "reasonably necessary or appropriate to provide safe or healthful employment and places of employment"). Apparently, the thrust of the textile industry's argument on this point is not that OSHA lacks the power to promulgate a standard that reduces worker exposure to the lowest feasible levels. Rather, the industry argues that OSHA inadequately explained why "it chose to apply its full range of powers" instead of accepting the industry's less stringent alternative. *Id.* at 63-64.

[83] *See id.* at 57-59. The Act does not itself define "material impairment." Although testimony at the rulemaking hearing described the acute symptoms of byssinosis as "a serious health

that this claim and its attendant argument must fall in the face of the agency's evidence and reasons.

The agency adopted a "dust control strategy" after finding conclusive evidence of a causal relation between exposure to cotton dust and the contraction of respiratory diseases, such as byssinosis. The agency acknowledged gaps in medical understanding of the specific causal relationship between cotton dust and disease.[84] Nonetheless, the agency's mandate requires it to protect workers' health even before the resolution of all medical and scientific uncertainties about the particular health risk.[85] Further, OSHA heard several witnesses conclude that at present," there is no basis for any programs of prevention and control of byssinosis other than those based on prevention of exposure to respirable cotton dust." [86] Virtually without exception, key textile industry witnesses along with public health experts rejected medical surveillance as an alternative to dust reduction.[87] Accordingly,

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hazard," Hearing Transcript at 168 (testimony of Dr. Bouhuys), we do not here need to decide whether these symptoms constitute "material impairment" for the purposes of the Act. Instead, we find adequate support in the record for the agency's choice of the dust control strategy effectively to protect workers from byssinosis, which is conceded by all to cause material impairment in its chronic stage.

[84] *See* note 16 *supra.*

[85] *See* H. Rep. 91-1291, 91st Cong., 2d Sess. at 18 (1970), *reprinted in* LEGIS. HIST. at 848 (OSHA not to "be paralyzed by debate surrounding diverse medical opinion"). *See also* Soc'y of Plastics v. OSHA, 509 F.2d 1301, 1308 (2d Cir. 1975), *cert. denied*, 421 U.S. 992 (1975).

[86] 43 Fed. Reg. 27355 (1978).

[87] The textile industry's leading witness, Dr. Imbus of Burlington Industries, acknowledged that "[m]edical surveillance programs are not a substitute for diligent efforts to control dust." J.A. 396.

[Continued]

the agency adduced considerable evidence to support its dust control strategy.

The agency's approach, which is similar to its strategy in regulating asbestos,[88] is authorized by the primary purpose and by the special mandate of the Act. Section 2(b) sets out the Act's broad protective purpose: "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions." Toward this end, section 6(b)(5) authorizes OSHA to set permanent standards for occupational exposure to "toxic materials or harmful physical agents" at the level

> which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.[89]

Contrary to the industry's view, this mandate does not restrain the agency from acting to prevent irreversible health damage until workers actually suffer the early symptoms of byssinosis. Instead it is a mandate to reduce

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[87] [Continued]

The need for a dust control strategy was a constant theme of expert testimony. Drs. Merchant and Bouhuys, for example, both recommended PELs well below the 500 $\mu g/m^3$ level proposed by the textile industry. At the hearing, Dr. Bouhuys and NIOSH recommended a 200 $\mu g/m^3$ PEL. J.A. 1233, 1448. Dr. Merchant recommended a PEL of 100 $\mu g/m^3$. J.A. 369. Even Dr. Weill, who appeared on behalf of the textile industry, declined to endorse the industry's proposed PEL. Instead he recommended that the PEL be set somewhere between 200 $\mu g/m^3$ and 500 $\mu g/m^3$. J.A. 1237.

[88] *See* 29 C.F.R. 1910.93a (1978); Industrial Union Dep't v. Hodgson, 499 F.2d 467, 478-81 (D.C. Cir. 1974) (discussing asbestos standard).

[89] 29 U.S.C. § 655(b)(5) (1976).

the risk of that irreversible damage—especially for those workers who have regular exposure to the causal agent, cotton dust. In the present case, OSHA adequately documented the risk of such damage attributable to continued exposure to cotton dust. Medical experts testified on the record that the early, acute symptoms of byssinosis weaken the worker's pulmonary system and increase his susceptibility to the adverse effects of subsequent cotton dust exposure.[90] We therefore uphold OSHA's decision to reduce the prevalence of chronic byssinosis through regulations stringent enough to reduce even the occurence of the reversible acute stage of the disease.

B. *Feasibility of the Standard*

All parties acknowledge that OSHA must evaluate technological and economic feasibility in setting permanent standards under section 6(b)(5) of the Act. These considerations set constraints on the agency's mandate to assure employees "the highest degree of health and safety."[91] In light of petitioners' claims, we must examine the record to ensure that OSHA has not exceeded its mandate by neglecting these constraints.

We are assisted here by this court's interpretation of the feasibility requirement in *Industrial Union Dep't, AFL-CIO v. Hodgson.* In that case, we concluded that

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[90] *E.g.*, J.A. 1218.

[91] § 6(b)(5); 29 U.S.C. § 655(b)(5) (1975). The Secretary is to promulgate a health and safety standard "which most adequately assures, *to the extent feasible,* on the best available evidence, that no employee will suffer material impairment or health or function capacity. . . . In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, *the feasibility of* the standards, and experience gained under this and other health and safety laws." (emphasis added).

the feasibility requirement reflects Congress' recognition that employees would not be protected if their employers were put out of business.[92] This possibility is all too real if the agency inflexibility requires protective devices unavailable under existing technology or otherwise makes financial viability impossible.[93] At the same time, we concluded, standards do not become infeasible simply because they may impose substantial costs on an industry, force the development of new technology, or even force some employers out of business.[94] Otherwise the Act's commitment to protect workers might be forever frustrated.

In this case, the textile industry petitioners contend that the record does not support OSHA's findings of technological and economic feasibility. First, they argue that the standard is technologically infeasible for the spinning through weaving stages of textile manufacturing.[95] Further, they argue that the record does not sup-

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[92] 499 F.2d 467, 477-78 (D.C. Cir. 1974).

[93] *Id.*

[94] "It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers." *Id.* at 478.

[95] Textile Brief at 20, 28-34. According to the industry, the production of fabric from cotton involves twelve distinct manufacturing operations, falling into three general stages. *Id.* at 7.

During the first stage, raw cotton is cleaned and prepared for spinning into yarn. This first stage involves opening, picking, carding, drawing, and roving the cotton. The second stage transforms the prepared cotton into yarn and packages it for subsequent processing. The principal operation in this stage is spinning, during which the prepared cotton slivers are elongated. The next operations in this stage consolidate units of spun yarn and prepares them for weaving by twisting, winding, spooling, and warping. The third stage of oper-

port the agency's finding that the standard is economically feasible. In addition, they argue that "OSHA failed to satisfy its obligation seriously to weigh even its grossly understated costs against the benefits sought to be secured by the Standard." [96]

Our review of these challenges is not designed to resolve the technical and economic debates. Our duty is simply to determine from close scrutiny of the entire record whether the feasibility of the standard is adequately supported by data and policy considerations. In addition, the agency must have considered and responded to serious challenges to the claim of feasibility. On both counts, we find that OSHA has performed its task adequately.

1. *Technological feasibility*

The textile industry does not argue that the exposure level set for the intial stages of textile manufacturing is technologically infeasible.[97] Its attack is limited to the feasibility of the level set for the later stages of spinning through weaving,[98] and to the four-year deadline for

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ations involves slashing and weaving. Slashing adds sizing to the yarn; weaving then interlaces two sets of yarn to produce a woven fabric. Under the cotton dust standard, the first two stages are classified together as "yarn manufacturing." *Id.* at 7-8.

[96] *Id.* at 21. The Unions also challenge the standard under the feasibility requirement, but unlike the textile industry petitioners, they argue that the exposure level set by the agency is not the lowest one feasible. We consider this challenge in note 150 *infra*.

[97] *Id.* at 25 ("general principles of dust control . . . are expected generally to yield compliance in the operations from *opening through roving*" stage.

[98] *Id.* at 24-35 (challenging technological feasibility of 200 $\mu g/m^3$ set for spinning through warping and 750 $\mu g/m^3$ set for slashing and weaving).

compliance.[99]

Judging the technological feasibility of a particular agency goal is beyond the expertise of the judiciary especially where the assessment involves predictions of technological changes.

Instead, our task on review is to find whether the agency sufficiently supported its feasibility determination with material in the record. Here, the agency's position is supported with evidence that existing dust control techniques can bring about compliance in the textile industry.[100]

First, OSHA points to evidence in the record that many employers already are in compliance with the 200 $\mu g/m^3$ PEL set for spinning through warping operations. This finding at least in part refutes the industry's charge that on technological grounds it cannot meet the required exposed level for these operations. Notably, three-fourths of the spinning operations described in the industry's own study had dust levels below the 200 $\mu g/m^3$ level and others were very close to voluntary compliance.[101]

The textile industry does not contend that the looms or frames not yet in compliance in any way differ from those already complying with the new PEL. Rather, the industry asserts that the noncomplying mills run dustier

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[99] *Id.* at 34-37. *See* Part V *infra* for our consideration of this claim.

[100] These measures include improving general ventilation, and requiring better maintenance of equipment. OSHA also recommended more thorough cleaning of the cotton in the opening and cleaning processes, and better dust control in the opening through roving stages or isolation of these operations. *See* 43 Fed. Reg. 27363-65 (1978). *See also* J.A. 3607-08, 1145 (improving general ventilation); J.A. 80 (equipment maintenance); J.A. 1886 (cleaning of cotton); J.A. 2445 (dust control); and J.A. 551 (isolation of certain processes.

[101] *See, e.g.*, J.A. 3490-3560; 2008-2011. *See generally* 43 Fed. Reg. 27362-68 (1978).

cotton. This contention, as OSHA answers, is belied by the record, for the requisite PEL has been met in spinning operations running 100% coarse cotton, which is the dustiest variety.[102]

There is also evidence that some mills have achieved low dust levels in the twisting, winding, spooling, and warping operations.[103] OSHA admits that these operations have been studied less than spinning, apparently because these operations generate very little cotton dust.[104] The agency nevertheless obtained evidence that existing dust control principles can be adapted to these operations as the need arises.[105]

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[102] J.A. 3532, 3538-40, 3544.

[103] J.A. 792-93, 1887; 43 Fed. Reg. 27367 (1978).

[104] *See* 43 Fed. Reg. at 27367 ("Levels in [winding, spooling, twisting, and warping] are currently very low and are not expected to present a compliance problem") (citations to the record omitted).

[105] *See, e.g.*, J.A. 2240-41. Thus OSHA acknowledged that the

> industry has had less experience with specific controls past roving. OSHA recognizes these difficulties and further recognizes that increased effort may be necessary in some instances to achieve compliance with the exposure limits prescribed for the textile operations. Yet, the evidence in the record demonstrates the feasibility of adopting dust control principles, proven successful in other operations, to new stages of the process.

32 Fed. Reg. 27362 (1978). The agency also concluded generally that "inherent operational difficulties found in some operations may require increased effort to reduce dust levels to 200 $\mu g/m^3$; however, OSHA agrees with RTI's assessments and concludes that the vast majority of workplaces will be able to comply with little difficulty." *Id.* at 27367. ("RTI" is the Research Triangle Institute which completed the "Technological Feasibility Assessment and Final Inflationary Impact Statement" for OSHA. J.A. 457. *See* text at note 51 *infra.*)

Similarly, the PEL set for slashing and weaving operations apears reasonable in light of the record. The industry's own chief witness estimated that 72% of the weaving operations met the requirement of 750 $\mu g/m^3$ when studied.[106] OSHA also cited a study in the record that identified three basic approaches to permit compliance by the remaining mills in these operations: (1) isolating the weaving rooms; (2) separating room ventilation systems; and (3) installing local exhaust ventilation equipment.[107]

Thus, for each operation of textile manufacturing, the agency established evidence of present compliance and existing control measures capable of increasing compliance. The agency therefore concluded that a

> combination of specific control measures . . . the adoption and modification of general dust controls, and further utilization of technological developments . . . already underway, should achieve compliance for the textile industry.[108]

The industry objects that OSHA drew unwarranted generalizations from dust measurements at small numbers of plants[109] and from expert testimony on general

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[106] Testimony of Hovan Hocutt, J.A. 3929-3920. Other evidence submitted by the industry suggests that compliance may be even more widespread for the weaving operations. Of 32 weaving operations studied, 28 were below 750 $\mu g/m^3$, and no reading was greater than 870 $\mu g/m^3$. J.A. 3490-3560. And these measurements were taken before recent improvements in dust control. *See* J.A. 3490-3560.

[107] 43 Fed. Reg. 27367 (1978) (summarizing Research Triangle Institute (RTI) Technological Feasibility Assessment and Final Inflationary Impact Statement, IV-14-16 (1976), J.A. 1, 550-552).

[108] 43 Fed. Reg. 27362.

[109] OSHA's brief merely cites several instances where dust levels in [the twisting, winding, spooling and warping]

principles of dust control.[110] We agree that OSHA might have improved the quality of the record with more extensive studies at different mills and over different periods of time.[111] Further study, however, would have added substantial additional cost and delay to an already costly and prolonged rulemaking proceeding.[112] Rather than directing the agency to wait for the best evidence, the OSH Act requires the agency to develop standards based upon "the best *available* evidence."[113] This court will not require further survey research from the agency especially where it has made an informed decision to rely

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operations are at or below 0.5 mg/m³ or 0.2 mg/m³. None of these references prove, or even suggest, that the required 0.2 mg/m³ either exists on a constant basis or is being achieved by the application of dust control equipment.

Textile Reply Br. at 8.

[110] Textile Br. at 29.

[111] It also would have been helpful to the court if OSHA had more fully delineated the methodological assumptions underlying some of the studies on which it relied. A more logical and systematic explanation of the inferences drawn from studies would have facilitated our review. Nonetheless, the agency did adequately explain the factual and policy considerations informing its judgments.

[112] The Unions and the North Carolina Public Interest Research Group filed suit in 1975 to prevent what they contended was unlawful delay in promulgation of the standard. Amalgamated Clothing & Textile Workers Union, et al. v. Secretary of Labor, No. 75-2157 (D.C.D.C.). The district court judge repeatedly admonished the government to promulgate the standard without improper delay. *See* Transcript of Proceedings on June 6, 1978. Secretary of Labor Marshall makes reference to this suit in his May 24, 1978 "Memorandum . . . to President Carter Urging Issuance of Cotton Dust Standard." 8 BNA Occupational Safety and Health Reporter 54-55 (June 8, 1978).

[113] Section 6(b)(5), 29 U.S.C. § 655(b)(5) (1976).

on other credible sources of information, such as the extensive expert testimony, written comment and briefs, and research studies used here.[114]

Indeed, other circuits have upheld permanent health standards supported by less extensive and persuasive evidence than that present here. Those courts have upheld similar OSHA standards that require compliance with PELs that had never before been attained,[115] or that had been reached only at the "newest, cleanest" plants.[116] Here, OSHA has shown that much of the textile industry already has demonstrated its ability to comply with the cotton dust standard. It also points to evidence in the record that little, if any, technological innovation will be necessary for compliance to be reached in the entire in-

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[114] In its "Proposed Standards and Notice of Hearing," OSHA said that it

> recognizes that many of the matters considered in this proposal are controversial and that gaps exist in the available scientific evidence. OSHA believes, however, that in this case we are dealing with an agent or agents that are extremely harmful to man. The existence of unanswered questions cannot be permitted to delay the process of proposing a standard for protecting workers exposed to cotton dust, as tens of thousands of workers are believed to suffer from the effects of exposure. OSHA hopes that the public participation which is invited will help to fill whatever gaps exist.

41 Fed. Reg. 56508 (1976).

[115] Society of the Plastics Industry, Inc. v. OSHA, 509, F.2d 1301 (2d Cir.), *cert. denied*, 421 U.S. 992 (1975).

[116] American Iron and Steel Inst. v. OSHA, 577 F.2d 825, 833, 834 (3d Cir. 1978), *petitions for cert. pending*, Nos. 78-918, 78-919 (upholding OSHA's standards for coke oven emissions on the basis of reductions in emission levels at some plants; concluding that the industry "could with some self-confidence and determination develop 'their own technological potentialities' and achieve a variety of improvements.").

dustry.[117] Thus, the agency's finding of technological feasibility here is even more persuasive than findings affirmed in other cases that require the creation of new technology.

In sum, the agency fairly considered and took account of objections to its assessment of technological feasibility for the textile industry.[118] The agency linked its determination to evidence and policy considerations in the record. We support its judgment.

2. *Economic Feasibility*

The petitioners concede that OSHA's estimate of $550 million in capital costs would be economically feasible for the textile industry, but they claim that OSHA's estimate grossly understates the actual costs the industry will incur if the standard goes into effect. To evaluate this claim, we must first consider the accuracy of OSHA's cost estimate and then review its feasibility determination.

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[117] OSHA noted one instance in which technological innovation would assist compliance with the cotton dust standard. Conversion of mills from traditional "ring" spinning to "open end" spinning would reduce the dust exposure to workers, yet, as OSHA acknowledged, ring spinning is not yet practical for all textile mills. 43 Fed. Reg. 27367 (1978). The agency concluded that "present general principles of ventilation control coupled with proven and applied control strategies" would be sufficient to bring the spinning operations into compliance, and technological innovation would simply be encouraged. *Id.*

[118] OSHA stated that it found unpersuasive the testimony of the textile industry's chief expert witness, Hovan Hocutt. The agency observed that Hocutt's experience derived primarily from his knowledge of the opening through roving operations, while the standards governing the operations of spinning through weaving gave rise to the most serious challenges. Further, the agency concluded that Hocutt "seemed to view each process in isolation and completely and consistently ignored the possibilities of dust control [other than through local exhaust equipment.]" OSHA Br. at 106, n.84.

a. Accuracy of cost estimates

OSHA derived its cost estimates from two principal sources: the Research Triangle Institute (RTI) estimates for the entire textile process [119] and industry estimates for part of the textile process.[120] OSHA tried to account for the divergence between the estimates from these two sources by exploring the assumptions each employed.[121] After examination, the agency decided that both sets of estimates are overstatements, and chose to rely on what it regarded the best portions of each estimate.[122]

All parties agreed that the largest cost imposed by the standard is the capital cost of engineering controls. OSHA found the RTI capital cost figures to be overstated on several bases.[123] OSHA concluded that RTI inappro-

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[119] Research Triangle Institute, Cotton Dust: Technological Feasibility Assessment and Final Inflationary Impact Statement VI- V-129 & Appendices B, C & D (1976) (prepared for OSHA) (reprinted at J.A. Vol I at 619-750, 801-995 & Appendices B, C & D)). *See also* "Technological Feasibility and Economic Impact of Regulations for Cotton Dust: Testimony to be Presented by The Research Triangle Institute at Public Hearing," (1977) (reprinted at J.A. Vol. II, 1320-80.

[120] *See* Statement of Hovan Hocutt, Senior Vice President of Engineering Pneumafil Corporation, J.A. Vol. II, 2228-47; Statement of Arthur Thomas, Senior Vice President, The Bahnson Company, J.A. Vol. II at 2248-57.

[121] *See* 43 Fed. Reg. 27370-27380.

[122] OSHA's estimate of total compliance costs for the textile industry is based on the industry estimates for capital costs and annualized costs, and the RTI estimates for costs of medical surveillance and other non-capital expenditures. 43 Fed. Reg. 27373 (1978); *id.* at 27380 (Table 3).

[123] OSHA also criticized the RTI estimates of annualized capital costs for failing to take account of the investment tax credit. *Id.* at 27371. The estimates also assumed a high interest rate, but OSHA found this an acceptable reflection of the industry's external financing situation. Thus, OSHA concluded that the RTI estimates of annualized capital costs were calculated on a "conservatively high basis." *Id.*

priately included estimates for plants processing blends between cotton and synthetics.[124] Further, OSHA found that RTI neglected the cost advantages available when compliance is achieved through moderizing rather than retrofitting the machinery.[125] RTI also assumed industry-wide compliance with the old standard of 1,000 $\mu g/m^3$.[126] Thus, RTI estimated only the incremental cost necessary to achieve compliance with the new PEL. This estimate necessarily was inaccurate, as some of the industry had not yet complied with the old standard, while other plants already had met the stricter new standard.[127] Further, industry witnesses testified that "substantial amounts of [recommended] controls are, in fact, in operation." [128]

OSHA found the industry's capital cost estimates to be overstated as well. Like RTI, the industry estimated only the costs of retrofitting old machines; it did not consider replacing them with new machines that are more productive and generate less dust.[129] Similarly, the in-

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[124] OSHA excluded from its final standard equipment producing synthetic fibers because it does not generate cotton dust. Yet such equipment was included in the RTI estimates for cotton blend plants. 43 Fed. Reg. 27370 (1978). On the basis of RTI calculations, OSHA found that exclusion of equipment used to produce synthetics could reduce compliance costs by as much as 30 percent. *Id.* at 27372, 27380 Table I & n.4; OSHA Brief at 113.

[125] 43 Fed. Reg. 27370-71 (citing testimony of Dr. Parker C. Reist that the cost of control declines with more productive, new machines).

[126] *Id.* at 27370. The existing standard set the cotton dust exposure level at 1000 $\mu g/m^3$. *See* TAN 27 *supra* (history of the standard).

[127] 43 Fed. Reg. 27370.

[128] *Id.* (testimony of Harold Imbus and Hovan Hocutt).

[129] The agency included this statement in its reasons for concluding that the AMTI estimate was exaggerated:

> While OSHA recognizes the validity of estimating compliance costs for retrofit controls, OSHA also recognizes

dustry "may have included some equipment which is used exclusively for synthetics" and thus inappropriately included in cotton dust control cost estimates.[130] The agency also noted that the industry estimates failed to account for improvements in technology that can reasonably be expected during the four-year compliance period.[131]

Finding both sets of capital cost estimates in the record to be exaggerated, the agency chose to rely on the substantially lower industry estimate. Unlike the RTI study, the industry's assessment reflected concrete data on actual industry dust levels and use of controls.[132]

Ironically, it is now the industry that challenges the accuracy of its own data.[133] The textile industry petitioners argue that OSHA's reliance on the industry's capital cost estimate is invalid because it is "wholly unrelated to the exposure limits set by the Standard." [134] The industry notes that its $550 million figure was advanced as the projected capital cost of compliance with a PEL of 200 $\mu g/m^3$ in opening through roving, 500 $\mu g/m^3$ in spinning through warping, and 1000 $\mu g/m^3$ in

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> the existing trend toward replacement of conventional machines with newer equipment which is more productive and produces less dust and which would lead to the prediction of fewer machines to be retrofitted or to be controlled [.]

43 Fed. Reg. 27372.

[130] *Id.*

[131] *Id.*

[132] AMTI cost estimates were based on a recent survey it conducted. 43 Fed. Reg. 27371 (1978). OSHA concluded, "Since AMTI estimates are based on more recent data, OSHA believes them to be more realistic than those offered by [RTI]." *Id.* at 27373.

[133] Textile Brief at 39.

[134] Textile Brief at 41.

slashing and weaving.[135] Thus, for spinning through weaving, the industry's estimate assumed a PEL requirement higher than the ones ultimately adopted—the 200 $\mu g/m^3$ level for spinning through warping and 750 $\mu g/m^3$ in slashing and weaving. The textile industry contends that by ignoring this fact, OSHA's final standard is based on a grossly understated cost estimate.

OSHA, however, marshals sufficient support and analysis for its decision to use the industry's capital cost estimate. Contrary to the industry's claim that this estimate is "wholly unrelated" to the PELs in the final standard, OSHA's technological assessment concluded that little more than the dust control measures assumed by the industry would be necessary to achieve the final PEL.[136] OSHA also explained that even the industry capital estimates were exaggerated because they included some unnecessary costs.[137] Thus, OSHA reasonably viewed the industry's figure as an overstated estimate for exposure levels set slightly higher than those in the agency's final standard.

Since the only other available figure was the far less accurate RTI estimate[138] the agency's ultimate reliance on the industry's capital cost estimate is reasonable. The RTI estimate lacked a basis in the industry's actual dust reduction. It also presumed a PEL for weaving and slashing far lower than the final PEL, which more nearly

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[135] 43 Fed. Reg. 27371, 27380 Table I & n.1 (1978).

[136] OSHA Brief at 112 (discussing determination that local exhaust ventilation would not be necessary for spinning and twisting operations).

[137] *See* TAN 129 *supra*.

[138] *See* TAN 132 *supra*.

approximated the exposure level and control technology assumed by the industry.[139]

The very nature of economic analysis frequently imposes practical limits on the precision which reasonably can be required of the agency. This is especially the case where, as here, the industry chooses to withhold from the agency part of the data underlying the industry's cost estimates.[140] OSHA's mandate authorizes it to promulgate standards on the basis of the "best available evidence." [141] We find that OSHA reasonably evaluated the cost estimates before it, considered criticisms of each, and selected suitable estimates of compliance costs.[142]

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[139] OSHA concluded:

> Most of the changes from the proposal in this final regulation have cost reducing effects. The principal cost reducing change is the increase in the permissible exposure level from 200 to 750 $\mu g/m^3$ for slashing and weaving. In some cases of control costs this difference in cost as a result of the higher PEL is not assessed. However, in other cases of control costs, such as slashing and weaving, because the need for certain engineering controls and/or amounts of air and filtration would be changed costs were shown to be reduced significantly. For this reason OSHA has adopted the [AMTI] estimate for slashing and weaving which predicted a level of 1,000 $\mu g/m^3$ instead of the RTI estimate for slashing and weaving at 200 $\mu g/m^3$.

43 Fed. Reg. 27371 (1978).

[140] The industry declined to give the agency access to its survey data or its detailed estimation methodology. 43 Fed. Reg. 27373; OSHA Brief at 113. This impaired the agency's ability to construct more accurate cost estimates once it found both the industry and RTI estimates inaccurate.

[141] 29 U.S.C. § 655(b)(5) (1976).

[142] *See* note 132 *supra*. OSHA decided to rely on the RTI estimates for the cost of non-engineering provisions, such as monitoring workers' health and providing respirators as needed. 43 Fed. Reg. 27372 (1978). OSHA considered these

b. Feasibility of compliance costs

The actual test for economic feasibility has yet to be fully developed by the courts.[143] This court has suggested that the costs cannot be "prohibitively expensive" for Congress would not have intended OSHA to make "financial viability generally impossible" for a regulated industry.[144]

Here, the agency had evidence in its record that the industry would be able to pass compliance costs on to consumers.[145] Although the record also contained testimony suggesting that older and smaller firms might bear a disproportionate financial burden,[146] it does not support the industry's claim of infeasibility. Even if a few firms are forced to shut down, the standard is not necessarily economically infeasible. As this court observed in *Industrial Union*,

> It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and

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estimates to be overstated because they failed to account for compliance with these provisions in some plants prior to the standard, *id.* at 27372-73, but as the industry offered little evidence on non-engineering costs, OSHA reasonably relied on the RTI estimates.

[143] Berger & Riskin, *Economic and Technological Feasibility in Regulating Toxic Substances Under the Occupational Safety and Health Act*, 7 ECOLOGY L. Q. 285, 285-86 (1978).

[144] Industrial Union Department v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974).

[145] 43 Fed. Reg. 27370 (RTI assumed that costs of compliance will be passed on).

[146] *Id.* at 27377-78 (citing testimony of Arthur Figh, Vice President, Chase Manhattan Bank).

> is consequently financially unable to comply with new standards as quickly as other employers.[147]

Here the agency expressly concluded "that although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened by the capital requirements of the regulation." [148]

Of course, the agency's underlying cost estimates are not free from imprecision. Nonetheless, on reviewing the record we believe that OSHA fairly considered all the economic data submitted before constructing its estimates. The agency responded to significant criticisms of the cost estimates it used, and explained the economic impact it projected for the textile industry. As a result, this court is satisfied that OSHA has substantial support in the record for its cost estimates and findings of economic feasibility for the textile industry. The position of the union petitioners on this issue [149] buttresses

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[147] Industrial Union Department v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974).

[148] 43 Fed. Reg. 27378 (1978). Further, alleged changes in the market structure of the industry do not signify economic infeasibility especially here, where the agency observed that textile manufacturing already tends toward increasing concentration. *Id.*

[149] In *Industrial Union*, this court observed that "Congress does not appear to have intended to protect employees by putting their employers out of business." 499 F.2d at 478. The Union here submits that its support of the cotton dust standard "demonstrates that it will have no such result." Union Reply Brief at 25. *See* American Iron and Steel Institute v. OSHA, 577 F.2d 825, 836-37 (5th Cir. 1978), *petitions for cert. pending*, Nos. 78-911, 78-1036 (court attaches significance to Union support in determining economic feasibility of OSHA standard).

OSHA's conclusion that the standard will not put the industry out of business.[150]

3. *Cost-Benefit and Cost-Effectiveness Analysis*

Industry petitioners would have this court impose an additional constraint on OSHA's authority to determine standards. They claim that under the feasibility requirement, OSHA must demonstrate that "the benefits of the standard are in proportion with the costs which it imposes." [151] This amounts to a claim that no standard may be promulgated under section 6(b)(5) of the Act absent a formal cost-benefit analysis.[152] The industry

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[150] The Union's assessment is not, however, determinative of the entire standard's economic feasibility. We must reject the Union's contention that the 750 $\mu g/m^3$ PEL which OSHA set for slashing and weaving operations must be remanded because it is not the lowest feasible exposure level. *See* Union Brief at 42. The record contains dose-response data showing reduced symptoms of byssinosis in the weaving area. 43 Fed. Reg. 27360 (1978) (discussing J.A. 218, 247, 361). OSHA determined that the presence of sizing in the weaving rooms tends to dilute the cotton dust and therefore allows for a greater permissible exposure level. Further, the technological obstacles to achieving a 200 $\mu g/m^3$ PEL in the weaving area pose extreme compliance costs. Meeting these costs would impede the industry's ability to achieve the 200 $\mu g/m^3$ level where it is more essential—in the opening through warping operations. *Id.; see* J.A. 2241-43. Thus, the agency reasonably adopted a higher PEL in slashing and weaving to permit compliance in the earlier stages of textile manufacturing where the dust exposure poses a more serious threat to health.

[151] Textile Brief at 53. In the industry's view, OSHA's failure to evaluate costs against benefits renders the agency's finding of economic feasibility invalid. *Id.* Similar arguments are made by National Cotton Counsel of America (NCCA), *see* NCCA Supplemental Brief at 15-16, and the petitioners from nontextile industries, *see* Nontextile Brief at 62-64.

[152] Cost-benefit analysis involves calculating the costs and benefits of various programs to compare their net present

similarly argues that OSHA must justify the expense imposed by its standard by comparing it with the industry's proposed alternative.[153]

OSHA agrees that a systematic evaluation of costs and benefits is to be *encouraged* within the limits of available estimation techniques,[154] yet it contends that such analysis is not *required.* OSHA argues that the OSH

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values. E. QUADE, ANALYSIS FOR PUBLIC DECISIONS 26-27 (1975). A study by The National Academy of Sciences concluded that cost-benefit analysis

> is not a rule or formula which would make the decision or predetermine the choice for the decision maker. Rather, it refers to the systematic analysis and evaluation of alternative courses of action drawing upon the analytical tools and insights provided by economics and decision theory. It is a framework and a set of procedures to help organize the available information.

NATIONAL ACADEMY OF SCIENCES, DECISION MAKING FOR REGULATING CHEMICALS IN THE ENVIRONMENT 39 (1975) (report prepared by National Research Council).

[153] Textile Brief at 54, 56 (citing section 3(8) of the Act, 29 U.S.C. § 652(8) (1976)). Essentially, petitioners here claim that the agency should have conducted an analysis of the cost-effectiveness of both the agency's dust control strategy and the industry's proposed alternative. In contrast to cost-benefit analysis, cost-effectiveness is only used to compare alternatives for reaching the same goal. Like cost-benefit, cost-effectiveness analysis often raises intractable problems in obtaining the requisite measures that enable comparison. QUADE, *supra* note 152 at 25-28. Although the two kinds of analysis differ, the petitioners raise essentially the same claim with each one: they ask us to find OSHA's failure to employ these methods a fatal flaw in its proceedings.

[154] 43 Fed. Reg. 27378 (1978). The agency noted that "although the benefits of the standard cannot rationally be quantified in dollars, OSHA has given careful consideration to the question of whether these substantial costs are justified in the light of the hazards of exposure to cotton dust." *Id.* at 27379.

Act constrains its regulation of dangerous substances "only by the limits of feasibility." [155] We agree. We also find that no additional constraint is imposed by the Act's definition of a health or safety standard as "reasonably necessary or appropriate to provide safe or healthful employment." [156] The language of the Act and the clear intention of Congress permit no other conclusion.

Other statutory schemes explicitly require such particular kinds of analysis. In the Clean Air Act, for example, Congress required the Environmental Protection Agency to perform a "cost benefit analysis" before prohibiting the manufacture or sale of a fuel or fuel additive which endangers public health or welfare.[157] Some Congressional Acts require a showing of "unreasonable risk" prior to regulation.[158] The legislative histories of these acts have led the courts to construe this provision to require regulatory agencies to balance costs and benefits of proposed action.[159]

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[155] *Id.* at 27378.

[156] 29 U.S.C. § 652(8) (1976).

[157] 42 U.S.C. § 1857f-6c(c)(2)(B) (1976). *See also* Federal Environmental Pesticide Control Act of 1972, 7 U.S.C. § 136 (bb) (1976) (determining "unreasonable risk to man or the environment" includes consideration of "economic, social, and environmental costs and benefits of the use of any pesticide").

[158] *E.g.*, Federal Hazardous Substances Act, 15 U.S.C. § 1261s (1976) (article is mechanical hazard if it presents "unreasonable risk of personal injury or illness"); Consumer Products Safety Act, 15 U.S.C. § 2058(c)(2)(A) (1976) (rule must be "reasonably necessary to eliminate or reduce an unreasonable risk of injury"); Toxic Substances Control Act, 15 U.S.C. § 2605(a) (1976) (requirements may be imposed if chemical presents "unreasonable risk of injury to health or the environment").

[159] *E.g.*, Forester v. Consumer Product Safety Comm'n, 559 F.2d 774, 789 (D.C. Cir. 1977) (footnote omitted):

> The requirement that the risk [posed by mechanical hazards] be "unreasonable" necessarily involves a balancing

In the OSH Act, in contrast, Congress itself struck the balance between costs and benefits in the mandate to the agency. Section 6(b)(5) unequivocally mandates OSHA to

> set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that *no employee will suffer material impairment* of health or functional capacity.[160]

Thus Congress concluded that the benefits of health protection warranted the expense of an effective standard.[161]

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test like that familiar in tort law: The regulation may issue if the severity of the injury that may result from the product, factored by the likelihood of the injury, offsets the harm the regulation itself imposes upon manufacturers and consumers.

See also Aqua Slide "N" Dive v. Consumer Product Safety Comm'n, 569 F.2d 831, 839, 844 (5th Cir. 1978) (using *Forester* balancing test definition for "unreasonable risk"); *id.* at 845 (Wisdom, J., concurring) (requiring substantial evidence for Commission's cost-benefit analysis).

As OSHA points out, when Congress wishes to require cost-benefit analysis, it does so explicitly; when it wishes a feasibility constraint instead, it so states. *See* OSHA Brief at 121 n.96 (citing legislative history of Mine Safety and Health Amendments of 1977, where Congress rejected amendments that would insert cost-benefit analysis).

[160] 29 U.S.C. § 655(b)(5) (1976) (emphasis added).

[161] Senator Eagleton, for example, stated during floor debates on the Act that

> The Costs that will be incurred by employers in meeting the standards of health and safety to be established under this bill are, in my view, reasonable and necessary costs of doing business. Whether we, as individuals are motivated by simple humanity or by simple economics, we can no longer permit profits to be dependent upon an unsafe or unhealthy workplace.

LEGIS. HIST. at 1150-51 (from the Congressional Record, Senate, Dec. 16, 1970).

In the legislative debates on the Act, Senator Yarborough who sponsored the bill responded in no uncertain terms to the claim that the proposed legislation would be too expensive:[162]

> We are talking about people's lives, not the indifference of some cost accountants. . . . We are talking about assuring our American workers who work with deadly chemicals that when they have accumulated a few years seniority they will not have accumulated *lung congestion* and poison in their bodies, or something that will strike them down before they reach retirement age.[163]

In contrast to the Acts for which Congress contemplated a cost-benefit requirement, the legislative history of the OSH Act contains no reference to this kind of economic analysis.[164]

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[162] Senator Yarborough preceded the statement quoted in text with this comment:

> [W]hen Congressman O'Hara and I introduced into the House and Senate the first comprehensive occupational health and safety bill, we drew the critical fire of several organizations who claim that legislation of this type is too expensive.
>
> One may well ask too expensive to whom? Is it too expensive for the company who for lack of proper safety equipment loses the service of its skilled employees? Is it too expensive for the employee who loses his hand or leg or eyesight? Is it too expensive for the widow trying to raise her children on meager allowance under workman's compensation and social security? And what about the man—a good hard-working man—tied to a wheel chair or hospital bed for the rest of his life? That is what we are dealing with when we talk about industrial safety.

LEGIS. HIST. at 510.

[163] *Id.* (emphasis added).

[164] Instead, Congress anticipated severe costs from the health and safety standards and provided a program of loans

Instead, Congress determined in the OSH Act that any severe risk to employee health must be eliminated or reduced if feasible means to do so exist.[165] This calls for a two-step analysis by the agency: (1) determining whether health impairment is threatened by the suspect substance, and (2) determining whether the selected strategy is to protect workers from this risk both technologically and economically feasible. Nothing in the statute or its legislative history requires a further determination that the costs of the standard bear a "reasonable" relationship to its benefits.[166] Nor may this court impose

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to small businesses seriously affected by OSHA standards. *See* section 28 of the Act (amending section 7(b) of the Small Businesses Act, 15 U.S.C. § 636 (1976)); Cong. Record (Senate) (Nov. 17, 1970), LEGIS. HIST. at 525-26 (remarks of Sen. Dominick).

[165] The House Report concluded:

> Even the price of one life is too expensive when a meaningful occupational safety and health law could save many lives. . . . The well-being of every American working man and woman is an essential human right which we can no longer deny.

H.R. Rep. No. 91-1291, 91st Cong., 2d Sess. 35 (1970), *reprinted in* LEGIS. HIST. at 865.

[166] Petitioners mistakenly believe that cost-benefit or cost-effectiveness analysis is mandated by the "reasonably necessary or appropriate" language in the Act's definition of health and safety standards. In another context, this court construed the familiar "necessary or appropriate" provision as authorizing "an agency to use means of regulation not spelled out in detail, provided the agency's action conforms with the purposes and policies of Congress and does not contravene any terms of the Act." Niagara Mohawk Power Corp. v. FPC, 379 F.2d 153, 158 (D.C. Cir. 1967). In this light, the "reasonably necessary or appropriate" language grants OSHA considerable discretion in adopting protective strategies to guard against particular health risks. While cost-benefit and cost-effectiveness analyses are techniques that can assist evaluations of such strategies, they are not required by the Act's provisions.

additional procedural requirements.[167] Indeed, the only authorities cited by petitioners are not binding on this circuit,[168] and in any event, they are not persuasive in this context.[169]

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[167] Under the Supreme Court's decision in Vermont Yankee Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 524 (1978), this court may not require OSHA to conduct cost-benefit analysis unless the agency or Congress officially requires this procedure. Such analysis is certainly not mandated in explicit terms by the statute. Nor is it implicated in the extra-statutory procedures OSHA followed in promulgating the cotton dust standard. *See* TAN 54-55 *supra* (discussing OSHA's additional procedures); *Judicial Review of Informal Rulemaking Procedure: When May Something More Formal Be Required?*, 27 AM. U. L. REV. 781, 811 (1978).

[168] Petitioners rely on Turner Co. v. Sec'y of Labor, 561 F.2d 82 (7th Cir. 1977) (noise abatement enforcement action) and three cases of another circuit, American Petroleum Institute v. OSHA, 581 F.2d 4931 (5th Cir. 1978), *cert. granted*, 47 U.S.L.W. 3554 (Feb. 20, 1979) (Nos. 78-911, 78-1036); Aqua Slide "N" Dive Corp. v. Consumer Product Safety Commission, 569 F.2d 831, 844 (5th Cir. 1978) (swimming pool slides); and Florida Peach Growers Ass'n v. Dep't of Labor, 489 F.2d 120 (5th Cir. 1974) (pesticide residue). *See* Textile Brief at 37-38, 53-59.

This court, however, is bound by its construction of the feasibility requirement in Industrial Union Department v. Hodgson, 499 F.2d 467, 477-78 (D.C. Cir. 1974) (asbestos dust), which has been adopted in American Iron & Steel Inst. v. OSHA, 477 F.2d 825, 835-36 (3d Cir. 1978) (coke oven emissions), *petitions for cert. pending*, Nos. 78-918, 78-919; AFL-CIO v. Brennan, 530 F.2d 109 (3d Cir. 1975) (revoking rule against permitting any workers' hands in machine dies). *See* TAN 92-94 *supra*.

[169] Petitioners' reliance on American Petroleum, *supra*, is especially unpersuasive. The Fifth Circuit there based its holding on its earlier interpretation of an entirely different statutory scheme in Aqua Slide "N" Dive Corp. v. Consumer Product Safety Commission, *supra*. *Aqua Slide* involved the Consumer Products Safety Act, 15 U.S.C. § 2058(c)(2)(A) (1976), which employs the "unreasonable risk" language

Further, cost-benefit analysis would not necessarily improve agency health and safety determinations.[170] These techniques require the expression of costs, benefits and performance in often arbitrary, measureable terms.[171] They may hide assumptions and qualifications in the

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that courts have construed to require a balancing test. *See* n.158 *supra*. No such language appears in the OSH Act provisions under which the cotton dust standard was issued. Congress apparently drew the sensible conclusion that consumers often may be in a better position than workers to estimate and avoid risks. Petitioners' view that the "reasonably necessary or appropriate" language requires cost-benefit analysis, Textile Brief at 55, is similarly misguided. *See* TAN 156 *supra*.

Finally, petitioners mistakenly rely on two more cases from other circuits that have little relevance to this case. *Florida Peach Growers Association v. Dep't of Labor, supra*, concerned the issuance of emergency standards under § 6(c) of the Act, 29 U.S.C. §)655(c) (1976). *Turner Co. v. Sec'y of Labor, supra*, similarly is inapposite. It involved the appeal of an enforcement proceeding against a single manufacturer under an existing noise standard. Although requiring a cost-effectiveness analysis by the agency the Seventh Circuit in *Turner Co.* explicitly endeavored to distinguish the noise regulated in that case from other hazards that pose "serious debilitating threats." *Id.* at 86. Just such a serious risk is posed by cotton dust exposure.

[170] *See* P. Schuck, *Regulation: Asking the Right Questions*, 11 NAT'L J. 711, 711 (1979):

> Cost-benefit analyses are also invariably flawed. The reasons for this are well-known: the difficulty of identifying and quantifying many costs and benefits; the inevitably arbitrary nature of valuations of human life or health; . . . the problem of interpersonal and intergenerational comparisons of utility; and many others.

[171] The National Academy of Sciences report, *supra* at 39-44, identifies this measurement problem and the general difficulty of estimating uncertain effects as serious shortcomings of cost-benefit analysis. For a similar view, *see* QUADE, *supra* at 25-26.

seeming objectivity of numerical estimates. Especially where a policy aims to protect the health and lives of thousands of people, the difficulties in comparing widely dispersed benefits with more concentrated and calculable costs may overwhelm the advantages of such analysis.[172]

OSHA considered the alternative proposed by the industry and found it inadequate to protect against the health risk at issue. We recognize that the agency's control strategy is costly. But it is the result of long and comprehensive investigation by the agency assisted by extensive public participation.[173] We find that the health risk posed by cotton dust warranted agency action, and that the final standard chosen by the agency is technologically and economically feasible for the textile industry within the meaning of the Act.[174]

IV. Non-Textile Industries

In the final standard, OSHA set a permissible exposure level of 500 $\mu g/m^3$ for all non-textile industries covered by the standard.[175] Three such industries here

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[172] Not only are the benefits of the regulation dispersed over thousands of people, they are also spread over lifetimes. The delayed effect of cotton dust exposure causes one of the difficulties in estimating its harm. In directing OSHA to promulgate standards on the basis of the "best available evidence," 29 U.S.C. § 655(b)(5) (1976), Congress wished to avoid administrative paralysis caused by experts' debates. H.R. No. 91-1291, 91st Cong., 2d Sess. 18 (1970), Legis. Hist. at 848. Certainly, it would not have wanted administrative paralysis caused by debate over a standard's cost and benefits.

[173] *See* TAN 30-34 *supra.*

[174] *See* TAN 97-150 *supra.*

[175] 43 Fed. Reg. 27360, 27395 (1978) (§ 1919.1043(c)(3)) (standard for all workplaces except yarn manufacturing and slashing and weaving).

challenge the standard:[176] (1) the cottonseed oil mills, which process cottonseed and its byproducts; (2) the cotton warehouses, which store raw, baled cotton; and (3) the classing offices, which classify samples of cotton fiber.[177]

The non-textile petitioners claim that OSHA failed to establish that their workers risk material health impairment and that the PEL set for these industries is arbitrary. Further, they claim that the standard is infeasible on both technological and economic grounds.

A. *Health Risks and Permissible Dust Exposure*

Petitioners do not dispute that their employees are exposed to cotton dust,[178] often at higher levels than in textile mills. They assert, however, that the work processes, dust composition, and worker exposure to dust in nontextile industries differ significantly from the textile industry.[179] In this way, petitioners seek to challenge OSHA's general position that exposure to cotton

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[176] *See also* note 1 *supra.*

[177] Non-Textile Brief at 4. OSHA explained that the standard applies to

> all non-textile industries including but not limited to: warehousing, compressing of cotton lint, classing and marketing, using cotton yarn (i.e., knitting), reclaiming and marketing of textile manufacturing waste, delinting of cottonseed, marketing and converting linters, reclaiming and marketing of gin motes and batting, yarn felt manufacturing using waste cotton fibers and by products.

43 Fed. Reg. 27360 (1978).

[178] Instead, petitioners argue that the composition of the dust in their workplaces differs from the dust in textile mills, Non-Textile Brief at 34-38.

[179] *E.g.*, Non-Textile Brief at 33.

dust poses a serious hazard to workers regardless of where the dust is encountered.[180]

The exact nature of the health hazard posed by cotton dust remains subject to medical debate.[181] The agency had before it conclusive evidence that dust found in textile mills causes debilitating disease;[182] it also had some evidence of related, though less severe, health impairments among workers in nontextile industries.[183] Although petitioners point to differences among the industries, OSHA's mandate requires it ot protect workers in all industries.[184] We find that OSHA fulfilled this mandate by reasonably relying on medical evidence from the textile industry[185] and evidence of health impairments

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[180] *See* 43 Fed. Reg. 27360-61 (1978).

[181] Petitioners claim that the bract and leaf-like trash is the element in cotton dust most likely to cause disease. Non-Textile Brief at 34. On this theory, petitioners attempt to distinguish the dust in their industries from the dust in the textile mills. *Id.* at 35-39. In so doing, petitioners rely on some studies that were not in the rulemaking record, *id.* at 34 n. 103, and ignore others actually in the record that contradict their conclusion, *see, e.g.*, J.A. 12.1 (Dr. Bouhuys). The agency fully explains the nature of the debate. 43 Fed. Reg. 27354 (1978). This court will not reach beyond the record to displace the agency's judgment that conclusive evidence is not yet available to isolate the causal agent.

[182] *See* Part III *supra.*

[183] *E.g.*, Report on the Evaluation of Respiratory Effects of Cottonseed Dust Inhalation (1976) (Jones & Weill study), J.A. 408-35 (acute broncho-constrictor effect in cottonseed oil mill employees); Testimony of Dr. Martin Barman, J.A. 2972 (1978) (pulmonary function decrements in warehouse employees).

[184] 29 U.E.C. § 655(b)(5) (1976).

[185] Courts have approved OSHA's extrapolations from evidence of carcinogens in one industry to another, related industry, *e.g.*, Soc'y of Plastics v. OSHA, 509 F.2d 1301, 1310

among nontextile workers.[186] The differences in the industries that were cited by petitioners do not undermine the agency's determination.

(2d Cir. 1975) (fabricators of products using PVC resins). This court has permitted an agency to draw on studies of one carcinogent to regulate another, related substance. EDF v. EPA, 578 F.2d 63, 83-85, (D.C. Cir. 1978) (approving extrapolation from knowledge about highly chlorinated polychlorinated biphenyls (PCBS) to less chlorinated PCBs). Petitioners claim that this case is inapplicable here because the court relied on the "ample margin of safety" section 307(a) of provision in Federal Water Pollution Control Act Amendments of 1972. 33 U.S.C. § 1317(a) (1976). Non-Textile Reply Brief at 16-17. For the purposes of permitting extrapolations, OSHA's duty to ensure that "no employee will suffer material impairment of health," 29 U.S.C. § 655(b)(5), is no less protective than the "ample margin of safety" provision. Further, deference to agency expertise and recognition of administrative feasibility also contributed to this court's approval of the agency's use of inference and extrapolation in *EDF v. EPA*. *Id.* at 46-48. These considerations apply with equal force here. *See also* American Federation of Labor v. Brennan, 530 F.2d at 115 (reviewing court does not sit to determine "scientific superiority" of agency's extrapolations).

[186] OSHA pointed to foreign studies of severe health impairments in nontextile industries, *e.g.*, Noweir, *et al.*, *Exposure to dust in the Cottonseed Oil Extraction Industry*, 19 ARCH. ENVIRON. HEALTH 99 (1969), J.A. 3210 (byssinotic symptoms in 35 out of 110 cottonseed oil mill workers); Barnes & Simpson, *Ventilary Capacity Changes on Expsoure to Cotton Dust*, MED. J. OF AUSTRALIA, 897 (May 25, 1968), J.A. 3218 (chest tightness and wheezing among workers in delinting and cottonseed storage industries). Petitioners criticize OSHA's reliance on these studies because the foreign plants differ from domestic ones. J.A. 3319; Non-Textile Brief at 23-26.

OSHA also had evidence of lung impairments in domestic nontextile industries, but generally these effects were less severe. (*E.g.*, Statement of Dr. K. D. McMurrain, J.A. 2719. (reviewing Jones and Weill Study of cottonseed oil mills).

The agency did acknowledge that health effects in the nontextile industries appear to be less prevalent and less severe than in the textile mills,[187] but concluded that the individual nontextile workers still run the risk of material health impairment. The agency reasoned that high worker turnover and movement in the workplace, rather than a lesser risk from exposure to dust, may explain the less severe aggregate pattern of disease.[188] We find no reason to disturb this judgment in favor of the more dubious conclusion that the nontextile workers are not endangered.

Moreover, the agency took account of the pattern of health effects when it raised the final PEL for the nontextile industries to 500 $\mu g/m^3$ from the proposed 200 $\mu g/m^3$ level.[189] The agency fairly concluded that the industries' data lent guidance to the permissible dust exposure level, but did not cast doubt on the agency's evidence of health risks to nontextile workers.[190]

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[187] 43 Fed. Reg. 27361 (1978).

[188] *Id.* (citing Statement of Phillip J. Wakelyn, National Cotton Council of American, J.A. 2698-2704, and other testimony in the record).

[189] 43 Fed. Reg. 27355 (1978).

[190] *Id.* The industry challenges the PEL as arbitrary. OSHA admits that "in the absence of detailed dose-response data, the risk to workers from cotton dust generated in many segments of the non-textile industry cannot be precisely defined." *Id.* Yet OSHA's mandate calls for standards "expressed in terms of objective criteria and of performance desired" whenever practicable. 29 U.S.C. § 655(b)(5)(5) (1976). To this end, the agency reasonably selected the PEL of 500 $\mu g/m^3$. The agency explained that this level for only respirable dust is roughly equivalent to the pre-existing theshold limit of 1.0 mg/m^3 of total dust. 43 Fed. Reg. 27361 (1978). *See* TAN 24-26 *supra*. Although expressing reservations, Merchant suggested 500 $\mu g/m^3$ as "not an unreasonable approach" pending further study. Tr. 1297, J.A. 3696. We agree.

OSHA thus explained the evidence it used, the reasons for its conclusions, and its responses to the industries' evidence and objections. When agencies are entrusted with regulating risks on the frontiers of scientific and medical knowledge, we cannot ask for more.[191]

Petitioners nevertheless argue that we should find it arbitrary and unreasonable for OSHA to set the standard before NIOSH completes its study of the nontextile industries.[192] Certainly, OSHA should take advantage of the ongoing research of NIOSH and other major inquiries into occupational health and safety. But by law, OSHA need not wait for NIOSH recommendations before protecting against occupational health risks.[193] Nor are

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[191] *See* Amoco Oil Co. v. EPA, 501 F.2d 722, 741 (D.C. Cir. 1974):

> Where . . . the regulations turn on choices of policy, on an assessment of risks, or on predictions dealing with matters on the frontiers of scientific knowledge, we will demand adequate reasons and explanations, but not "findings" of the sort familiar from the world of adjudication.

In Soc'y of Plastics v. OSHA, 509 F.2d at 1308, the Second Circuit observed that "though the factual finger points, it does not conclude." Nonetheless, the court concluded that OSHA is authorized "to act even in circumstances where existing methodology or research is deficient." *Id.*

[192] Non-Textile Brief at 42-44; Non-Textile Reply Brief at 10-14. Petitioners cite a NIOSH statement that identifies the limitations existing studies on non-textile cotton dust exposure. Non-Textile Brief at 42-44 (citing NIOSH Supporting Statement: Characteristics of Byssinosis in Segments of the Cotton Industry—Mattresses and Cotton Matting, Cottonseed Oil, Waste Recyclers, Cotton Warehousers and Cotton Classification Officers, J.A. 3036). NIOSH's criticisms were written to justify its decision to study the area, not to dispute the health risk posed by cotton dust in the non-textile industries.

[193] 29 U.S.C. § 655(b) (1976). Indeed, the Secretary may initiate the regulatory process on the basis of information submitted in writing to him by any interested person. 29

such recommendations conclusive.[194] A legitimate challenge to a health and safety standard can be raised as new data emerges,[195] but OSHA did not exceed its authority by regulating as soon as it knew of the risks of material health impairment from dust exposure.[196]

B. *Feasibility*

Judgments about the technological capabilities and financial positions of the industries affected by the stand-

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U.S.C. § 655(b)(1). OSHA is to base its standards on the "latest available scientific data in the field," 29 U.S.C. § 655 (b)(5), but it is not required to wait for data that is not yet available.

[194] NIOSH was created to assist OSHA in carrying out its general purposes and in fulfilling the research and training provisions of the statute. 29 U.S.C. § 671 (1978). This court determined that OSHA must consider all information made available by interested parties and experts, so determinations of NIOSH are only one factor in OSHA's deliberations. 499 F.2d at 476-77.

[195] An agency has a duty to revise its standards in light of new information. *See* Public Service Comm'n v. FPC, 511 F.2d 338 (D.C. Cir. 1975). OSHA has commendably committed itself to reviewing the standard it set for cotton gins "at the end of five years, or earlier if sufficient evidence of the need for a specific exposure limit is presented." 43 Fed. Reg. 27424 (1978) (standard to appear at 29 C.F.R. § 1910.1046, 1928.21). It would seem advisable for it to undertake a similar commitment for the non-textile standard at issue here.

[196] There seems no limit to petitioners' claim that OSHA has to wait for a pending study before promulgating the standard. After that study, there would always be another study, and then another, that could be deemed necessary contribution to the regulation. Congress did not intend OSHA to "be paralyzed by debate surrounding diverse medical opinion." H.Rep. 91-1291, 91st Cong., 2d Sess. at 18 (1970), *reprinted in* LEGIS. HIST. at 843. Rather, at OSHA concluded in this instance, "[p]rotection of employees cannot await resolution of all the points of scientific debate." 43 Fed. Reg. 27355 (1978).

ard depend on the evidence for each one, so we examine evidence on the warehouse, classing office, and cottonseed oil mill industries.

1. *Warehouses and Classing Offices*

The warehousing industry does not dispute the feasibility of the standard. Indeed, OSHA determined that most warehouses are already in compliance with the standard now that the final PEL for that industry has been raised to 500 $\mu g/m^3$.[197] For those portions of the industry not in compliance, the record indicates that improved ventilation and housekeeping will adequately assure compliance.[198]

OSHA also reasonably concluded that most classing offices[199] are "substantially in compliance" with the 500 $\mu g/m^3$ PEL.[200] Where dust control is necessary, the rec-

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[197] 43 Fed. Reg. 27368 (1978); J.A. 2961 (Statement of Phillip Wakelyn); J.A. 3008 (Nat'l Cotton Council of America, Economic Impact of OSHA's Proposed Cotton Dust Standard on Cotton Warehouses, 1977) (hereinafter cited as NCCA Warehouse Study). The industry and the agency both calculated exposure levels on a time-weighted basis, that is, averaged over a work day, because workers move in and out of dusty areas over the course of a day. NCCA Warehouse Study, J.A. 3010; Statement of Phillip Wakelyn, J.A. 2962; 43 Fed. Reg. 27395 (1978) (§ 1910.1043(c)(3)).

[198] *See* 43 Fed. Reg. 27368; NCCA Warehouse Study, J.A. 3009-11.

[199] Classing offices classify grades of raw cotton by examining small samples. *See* TAN 177 *supra.*

[200] 43 Fed. Reg. 27362 (1978). This finding is supported in the record. *See* J.A. 2339-40 (Hodgkins, Dep't of Agriculture, Control of Dust Levels in Cotton Classing Offices). As in warehouses, dust exposure in classing offices is calculated on a time-weighted basis. J.A. 3132 (Statement of American Cotton Shippers Association); 43 Fed. Reg. 27395 (1978) (§ 1910.1043(c)(3)).

ord supports OSHA's finding that minor ventilation modifications can effectively reduce dust exposure in classing offices to the requisite level.[201]

Thus we uphold the agency's finding that dust control is both technologically and economically feasible for warehousing and classing offices. These two industries claim, however, that non-engineering controls required by OSHA—medical surveillance and provision of respirators —will impose burdensome and unjustified costs.[202] Congress itself rejected this claim. It authorized the agency to regulate even if industries become financially burdened,[203] so long as the burden is not "prohibitively expensive." [204] OSHA need not "justify" its health and safety standards through a cost-benefit analysis [205] as the petitioners imply. Rather, OSHA must simply establish the risk of material health impairment and demonstrate the economic and technological feasibility of its standard for the regulated industries.[206] We hold that it has satisfied these requirements for the warehousing and classing office industries.

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[201] *See* 43 Fed. Reg. 27368 (1978); J.A. 2339-40 (Hodgkins, Dep't of Agriculture, Control of Dust Levels in Cotton Classing Offices).

[202] Non-Textile Brief at 60-62. As these petitioners maintain that OSHA failed to demonstrate a material health hazard in either the warehousing or classing office industries, they argue that the costs of complying with the standard are "completely unjustified." *Id.* at 63.

[203] *See* TAN 93-99 *supra.*

[204] Industrial Union Dep't v. Hodgson, 499 F.2d 467, 478 (D.C. Cir. 1974).

[205] *See* TAN 155-74 *supra.*

[206] *See* TAN 166 *supra.*

2. *Cottonseed Oil Mills*

Perhaps the most hotly contested aspect of the standard is its feasibility for the cottonseed oil industry. OSHA admits that considerable effort will be required for this industry to comply with the standard. We find that OSHA has adequately demonstrated the technological feasibility of the standard for this industry, but the record does not sufficiently establish its economic feasibility.

First, the record does sufficiently support the agency's conclusion that existing methods of dust control will permit compliance with the dust exposure level set for this industry. OSHA relied in part on evidence of dust control techniques already effective in related industries.[207] It also found support in the industry's own theoretical study that was designed as if the authors "were consulting engineers given the task of lowering dust levels in a typical cottonseed oil mill to the lowest feasible level." [208] As that study was commissioned by the industry in response to the proposed 200 $\mu g/m^3$ PEL,[209] we find no reason to disturb the agency's judg-

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[207] Ventilation, enclosure of dusty areas, use of modern equipment, and placement of hoods over particularly dusty machinery are techniques used in other industries that OSHA found applicable to the cottonseed oil mills. 43 Fed. Reg. 27369 (1978). *See* J.A. 1490 (Baier Statement); 2741 (Parnell Statement).

[208] OSHA relied on a theoretical study conducted by Dr. Calvin Parnell, Jr. for the National Cottonseed Products Association. *See* J.A. 2735 (Parnell Statement); J.A. 2865 (Parnell Study). The study described specific engineering controls and their costs for "a typical cottonseed oil mill processing 200 to 225 tons per day." J.A. 2868.

[209] The study did not specify the dust levels that would result from adoption of its recommended techniques for dust control. Parnell observed that "in accepting this assignment it was stipulated that the personnel working on this project

ment that the techniques proposed by the study would allow compliance with the final 500 $\mu g/m^3$ PEL.[210] Agencies are permitted to rely on estimates and policy judgments of this kind so long as they are fully explained and authorized by statute.[211] We therefore affirm the agency's finding of technological feasibility for this industry.

The agency's position on economic feasibility, in contrast, is neither clear nor adequately supported by the record. OSHA acknowledged that "[m]uch of the testimony on cottonseed processing . . . predicted dire eco-

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would not attempt to estimate the final concentrations that would result after implementation of these proposed engineering controls." J.A. 2875. The study was, however, commissioned by the industry in response to the proposed 200 $\mu g/m^3$ PEL, J.A. 2871, and did not find it impossible to attain that level.

[210] In addition to the claims addressed above the industry tries to bolster its infeasibility claim with the fact that the standard has not previously been enforced against the non-textile industries. Non-Textile Brief at 9 n.17. This previous history establishes only that a more limited definition of cotton dust prevailed before this standard was promulgated. *See* Sec'y v. Buckeye Cellulose Corp., OSHARC Doc. No. 1919 (Aug. 13, 1973), 367, J.A. 3246 (concerning cotton linters, a substance removed from cottonseed by the cottonseed oil mills). The standard before us employs a different, broader definition of cotton dust that includes the airborne dust in the non-textile industries. *See* Note 14 *supra*.

[211] Industrial Union v. Hodgson, 499 F.2d at 475-476. The Supreme Court noted recently that "complete factual support in the record for the [agency's] judgment or prediction is not possible or required" where assessments of future events are at issue. FCC v. Nat'l Citizens Comm. for Broadcasting, 98 S.Ct. 2096, 2122 (1978) (regulation of common ownership of broadcast station and newspaper in same community). *See also* Bradford Nat'l Clearing Corp. v. SEC, 590 F.2d 1085, 1103-04 (D.C. Cir. 1978) (judicial deference to agency increases where agency decision based primarily on predictions).

nomic effects including a substantial number of plant closings." [212] The industry estimated that 62 of the existing 83 mills, or approximately 52 percent of the industry's production capacity, will be forced to shut down if the standard is put into effect.[213]

In response, OSHA merely criticized the industry's estimate without constructing an alternative or fully explaining the basis for its criticism.[214] For example, OSHA suggested that the industry calculated "retrofit" costs twice.[215] Yet the agency never located these cal-

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[212] 43 Fed. Reg. 27374 (1978).

[213] Development and Planning Research Association, The Economic Impact of Proposed Cotton Dust Standards on the Cottonseed Processing Industry, VIII-8, J.A. 2855 (hereinafter cited as Cottonseed Impact Study). *See also* Tr. 3412-27, J.A. 4134-40 (Testimony of Mr. Wiseman, Vice-President of Development and Planning Research Association).

[214] 43 Fed. Reg. 27376.

[215] OSHA's position on "retrofit" estimate is in fact ambiguous. First, it explains that the industry's economic impact study devised an estimate that is 40 percent higher than the cost estimate of Parnell, designer of the theoretical technology assessment. 43 Fed. Reg. 27375 (1978). Yet OSHA admitted that "in the absence of further justification and breakdown of these costs by the industry, OSHA is unable to discount this economic impact estimate by any percentage." *Id.* Part of the confusion stems from the term "retrofit costs." Parnell explained that he used the term "retrofit" to mean costs he had not estimated for special space and construction problems in implementing the controls in particular, older plants. Tr. 3415-16, J.A. 4132-33. OSHA acknowledged that Parnell's "cost tables do not appear to reflect any such costs," yet claimed that Parnell's enclosure and isolation specifications may have entailed some of the costs also represented by the retrofit figure. None of OSHA's citations to Parnell's Study compare Parnell's figures with the "retrofit" cost. Moreover, it is Parnell's own statement that he did not include in his estimates the costs of modifications he called "retrofit." Tr. 3416, J.A. 4133. Thus, the record contains no evidence to support OSHA's claim that retrofit costs were included twice.

culations in the record nor identified the amount by which the cost estimate should be reduced to eliminate double-counting. Similarly, OSHA asserted without further explanation that the industry overstated production losses because the dust control strategy was designed to minimize such losses.[216] Also, OSHA claimed that the industry's cost estimate fails to acknowledge existing compliance with the standard, but the only evidence OSHA provides is the existence of a medical surveillance program in one company.[217] Absent more evidence on the extent of existing compliance, or the other asserted grounds of overestimation, we are unable to determine whether the industry's total cost estimate is unreasonable, as the agency contends. Even if the industry's estimate is exaggerated, OSHA offered no evidence that the cost of compliance will not cause "serious disruption," as petitioners claim.[218]

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[216] OSHA noted that the industry's estimated production losses were explained only as a result of reduced efficiency. 43 Fed. Reg. 27375 (1978). *See* Tr. 3421, J.A. 4134 (Testimony of Mr. Wiseman). OSHA concluded that such estimates were to some extent overstated because "Parnell's design study did include instances where the choice of design was based on the need to maintain efficiency." *Id.* This general statement is not clarified by citation to Parnell's Study, and thus this court finds no evidence in the record to support the agency's position on production losses.

[217] The agency cites one industry representative who "said the Buckeye division already had a medical surveillance program." 43 Fed. Reg. 27375 (1978) (citing Tr. 3396, 3397, 3410) (not included in Joint Appendix). The agency also noted that other industry representatives said "they did not know how many mills had surveillance programs." 43 Fed. Reg. 27375 (1978). Ignorance about the extent of compliance with one aspect of the standard, bolstered only by evidence of a medical surveillance program in one firm, cannot support the conclusion that incremental compliance costs will differ significantly from the industry's total estimates.

[218] *See* Cottonseed Impact Study, J.A. 2855.

Instead, the agency concedes that the standard may "accelerate" an existing trend of financial and economic decline in the cottonseed oil industry.[219] The agency apparently assumed that the standard's economic feasibility is not challenged because other factors will contribute to the anticipated shutdowns. In so assuming, the agency fails to indicate the number of shutdowns it anticipates or the role that the standard, as opposed to other economic pressures, will play in plant closings.[220]

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[219] OSHA asserts that

> to the extent that the existing secular decline in the number of mills continues and is accelerated by the costs of complying with the 500 $\mu g/m^3$ regulation, the industry estimate overstates the prediction of the capital costs of compliance by including the costs of all 83 firms presently in operation.

43 Fed. Reg. 27376 (1978). The force of this reasoning eludes us. The agency apparently concedes that the standard will contribute to the closing of some mills. Certainly, if some mills close, the industry's total compliance costs will decline. But this logic sidesteps the issue at hand: will the anticipated shut-downs so devastate the industray as to render the standard economically infeasible? *See* 499 F.2d at 477-78. Absent clearer indication of the agency's position, we cannot reach the question of what portion of an industry must be crippled by a standard for it to be deemed economically infeasible.

[220] As this court observed in *Industrial Union*,

> It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers. As the effect becomes more widespread within an industry, the problem of economic feasibility becomes more pressing.

499 F.2d at 478 (citation omitted). Without a clearer indication of the agency's reasoning in this case, we are unable to discern whether the scope of the anticipated shutdowns is consistent with the purposes of the Act or whether instead it

As a result, this court has no basis for reviewing the agency's conclusion that the standard is economically feasible for the cottonseed oil industry.[221]

Finally, the agency suggests that the industry will be able to pass the costs of the standard back to cotton growers.[222] OSHA argues that cotton growers will inevitably have a constant supply of cottonseed and will be willing to accept a lower price for the seed, shifting the loss forward to purchasers of raw cotton.[223] But the agency adduces no evidence or testimony to support this theory. In fact, the record shows only the contrary conclusion, drawn by the industry's economic impact study, that cotton producers will switch to other produce if the

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begins to put the standard's economic feasibility in jeopardy. Nor are we given a cost estimate that can be apportioned to the surviving mills, and thus no evidence as to their ability to bear the costs of the standard.

[221] The agency's position is too ambiguous for us to fully comprehend. Its apparent conclusion is that

> Some firms which may experience losses or *may apparently be marginal* in their profit position may decide to close. OSHA does not view such closings *necessary* as a result of regulation in view of secular decline in the number of oil mills over the decade.

43 Fed. Reg. 27376 (1978) (emphasis added).

[222] 43 Fed. Reg. 27375 (1978). OSHA acknowledges that it is unlikely that costs could be passed forward in the form of higher prices for cottonseed products. *Id.*

[223] [S]ince seed is a fiber byproduct, input supply for the industry is likely to be very price inelastic (amount of seed available generally remains the same regardless of price). Seed prices are subject to modification and costs as reflected in reduction of seed prices can be shifted forward by the fiber producers to the buyers of their main product, raw cotton.

43 Fed. Reg. 27375 (1978).

industry seeks to lower the price of cotton byproducts.[224] OSHA itself acknowledges that many past shutdowns of cottonseed oil mills have been due to contractions in the supply of cottonseed.[225] Absent more information, this court cannot determine whether the agency's cost pass-back theory adequately responds to the industry's estimate of massive shutdowns.

If the constraint of economic feasibility is to have any effect on the agency's rulemaking, it demands more serious consideration than it was given here.[226] The agency is allowed to rely on the best available evidence,[227] but here it simply gives general criticisms of the cottonseed industry's cost estimate. It failed to offer an alternative estimate of the standard's impact on this industry. As a result, the agency's position is too unclear to permit us to complete our reviewing function. We therefore re-

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[224] Cottonseed Impact Study, J.A. 2850; Tr. 3423-24, J.A. 4136037 (Testimony of Mr. Wiseman).

The study also concluded that assumptions about browers' conduct would not be made with confidence in light of the anticipated disruption from the entire standard. OSHA asserted that the final standard would not be disruptive, OSHA Brief at 118 n.94, but this would suggest only that it would not be impossible on that ground alone for costs to be passed back to the growers.

[225] 43 Fed. Reg. 27376 (1978) (citing Cottonseed Impact Study, J.A. 2781).

[226] In contrast, the agency carefully constructed a cost estimate for the standard's impact on the textile industry, and demonstrated that industry's ability to bear the estimated burden. *See* TAN 145-150 *supra*. The warehousing and classing office industries did not challenge the economic feasibility of the standard as they are already close to compliance, but the agency provided thorough responses to their claims that the standard is unjustified. *See* TAN 197-201 *supra*.

[227] Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5) (1976).

mand this issue for clarification or reconsideration by the agency.[228]

V. Other Challenges

We conclude that the standard withstands the remaining challenges to the standard's implementation period, employee-transfer provision, and use of pulmonary function tables.

A. *The Four-Year Implementation Program*

The standard does not require any employer to complete implementation of engineering or work practice controls until four years after its effective date.[229] The textile industry challenges this time period as too stringent; [230] the union challenges it as too lax.[231] Both groups

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[228] We do not require the agency to establish the standard's economic feasibility in a particular way. It may pursue its cost-shifting theory or it may demonstrate an alternative estimate for costs or shutdowns, as long as it obtains substantial support from factual and policy materials.

[229] 43 Fed. Reg. 27395 (1979) (§ 1910.1043(e)(3)(g)(iii)). *See also id.* at 27387. The more stringent proposed standard would have required employers to achieve 500 $\mu g/m^3$ immediately, 350 $\mu g/m^3$ in four years, and 200 $\mu g/m^3$ in seven years. *Id.*

[230] Textile Brief at 34-37 (claiming industry-wide compliance with four years not technologically feasible). The textile industry also challenges the six-month period selected by OSHA for intial monitoring of employee health. Textile Brief at 73 (challenging § 1910.1043(m)(2)(i), 43 Fed. Reg. 27398 (1978)). Although testimony was offered in support of a twelve-month period, J.A. 3064-65, 4151, some major industries testified that they already have medical surveillance and dust monitoring programs. J.A. 1987-88, 2035. OSHA's selection of the six-month period reasonably reflected this evidence, and the availability of a variance should assist any employer for whom this provision proves a hardship.

[231] The unions argue that the four-year period will permit unnecessary delay by employers who could comply sooner. They claim that this result would violate OSHA's mandate to

of petitioners claim that the agency's decision lacks support in the record, authorization under the OSH Act, and adequate explanation by the agency.

We find no basis to petitioners' claims. OSHA reasonably set the four-year compliance period to accommodate the competing needs of employers who need time to achieve compliance and the needs of employees who need protection from health risks.[232] The agency decided that to meet the standard's requirements, employers should first monitor employee health, consult with experts, and prepare detailed compliance plans.[233] The four-year period it chose we find will permit orderly, industry-wide compliance.[234] Employers for whom this period is infeasible can seek an administrative variance.[235] The agency still

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set the standard which most adequately assures, to the extent possible . . . that no employee will suffer material impairment of health or functional capacity." Union Brief at 31 (citing Section 6(b)(5), 29 U.S.C. § 655(b)(5) (1976)). The union claims that OSHA should have required employers to achieve compliance "at the earliest possible time, but no later than" a specified date, as it did in setting permanent standards for arsenic, see 29 C.F.R. § 1910.1018(g), and for coke oven emissions, see 29 C.F.R. § 1910.1029(7)(1)(i)(a).

[232] Besides competing interests, OSHA had to evaluate conflicting estimates of the time necessary for compliance. 43 Fed. Reg. 27385 (1978).

[233] *Id.* at 27383-86; *id.* at 27395 (to be codified at 29 C.F.R. § 1910.1043(e) (1978)).

[234] This manner of implementation is well within the scope of the agency's appropriate concerns. *See* Industrial Union v. Hodgson, 499 F.2d at 479 ("It is appropriate to allow sufficient time to permit an orderly industry-wide transition").

[235] Under § 1910.1043(e)(1) of the standard, the employer must utilize engineering controls and work practices to meet the permissible exposure limits "except to the extent that the employer establishes that such controls are not feasible." 43 Fed. Reg. 27395 (1978). And under § 6(b)(6)(A), (B) of the Act, 29 U.S.C. § 655(b)(6)(A), (B) (1976), an em-

assures protection to workers during the implementation period with the standard's respirator provisions.[236] We cannot disturb the agency's decision simply because petitioners would have struck a different balance between the needs of employers and employees.[237] We find that the four-year period reflects reasoned decisionmaking on the basis of the rulemaking record.

B. *The Medical Transfer and Wage Guarantee Provisions* [238]

The standard includes special provisions for employees who, for medical reasons, cannot wear respirators. Sec-

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ployer may obtain a temporary variance from the requirements of the standard upon showing that

> (i) he is unable to comply with a standard by its effective date because of unavailability of professional or technical personnel or of materials and equipment needed to come into compliance with the standard or because necessary construction or alteration of facilities cannot be completed by the effective date, (ii) he is taking all available steps to safeguard his employees against the hazards covered by the standard, and (iii) he has an effective program for coming into compliance with the standard as quickly as practicable.

See Industrial Union, 499 F.2d at 479-80.

[236] 43 Fed. Reg. 27384; *id.* at 27396 (§ 1910.1043(f)(1978)). Employers will incur the cost of providing respirators to all exposed employees until compliance with the appropriate PEL is attained. *Id.* at 27385.

[237] *See* Industrial Union v. Hodgson, 499 F.2d at 479.

[238] The union petitioners in this case have not challenged what they consider inadequacy in the medical surveillance provisions in the standard, since OSHA "has expressly represented . . . that [it] will shortly address this matter, in light of the conclusions reached by the agency in the rulemaking proceedings regarding the lead standard." Union Br. at 29, n.80. The union petitioners thus receive two broader questions, neither of which is implicated by the medical transfer

tion 1910.1023(f)(2)(v) provides for the transfer of such employees to positions outside the dusty areas:

> Whenever a physician determines that an employee is unable to wear any form of respirator, . . . the employee shall be given the opportunity to transfer to another position which is available or which later becomes available having a dust level at or below the PEL.[239]

This section also guarantees the wages and benefits of transferred employees:

> The employer shall assure [that] an employee who is transferred due to an inability to wear a respirator suffers no loss of earning or other employment rights or benefits as a result of the transfer.[240]

The textile petitioners argue that this provision exceeds OSHA's statutory authority.[241] We find to the contrary that this provisions falls within the agency's authority to include in its standards such "practices, means, methods, operations, or processes, [that are] reasonably necessary or appropriate to provide safe or healthful employment."[242] OSHA determined that a limited number of employees cannot be protected even temporarily by res-

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and wage guarantee provisions of the cotton dust standard: (1) should employers be required to take certain personnel actions such as transferring employees to less dusty areas of a plant when medical reports show them to be at increased risk; and (2) should certain employer actions be prohibited, such as firing employees based upon information obtained pursuant to the medical surveillance program. *Id.*

[239] 43 Fed. Reg. 27396 (1978) (§ 1910.1043(f)(2)(v)).

[240] *Id.*

[241] Textile Brief at 67-71.

[242] Section 3(8) of the Act, 29 U.S.C. § 652(8) (1976).

pirators.[243] Absent the medical transfer and wage guarantee provisions, during the interim compliance period these employees would be forced to suffer continuing exposure to impermissibly high dust levels or else risk disadvantageous transfers, or even risk losing their jobs.[244] Given these alternatives, such employees may refrain from disclosing actual health impairments from the dust exposure. OSHA is authorized to guard against such problems. Its mandate is to assure that "*no* employee will suffer material impairment of health or functional capacity" on the job.[245] In light of the Act's purposes,[246] OSHA sought to avoid these problems and properly placed the cost of employee protection on the employer.

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[243] Due to the high incidence of diminished pulmonary function among existing cotton dust workers OSHA expects that some employees will be found to be incapable of wearing a single use or other form of negative pressure respirators. . . . [C]ertain employees will be incapable of even wearing a PAPR [powered air purifying respirator]. An employee under such circumstances, in the absence of some opportunity to transfer to a position where a respirator need not be worn, might very well be discharged, or otherwise sustain economic loss, due to his or her inability to wear a respirator.

43 Fed. Reg. 27387 (1978).

[244] *Id.*

[245] Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5) (1976).

[246] The Act's overriding purpose is to "assure so far as possible every working man and woman in the nation safe and healthful working conditions." Section 2(b) of the Act, 29 U.S.C. § 651(b) 1979. *See also* Legis. Hist. at 1050-51 (remarks of Sen. Eagleton) (costs of health and safety standards are reasonable and necessary costs of doing business); *id.* at 1051 (remarks of Rep. Broomfield) (workers should not suffer while labor and industry argue);

Employers wil be burdened for only a short time by the medical transfer and wage guarantee provisions. Once employers achieve the requisite exposure levels, no employees, to be protected, will need respirators or job transfers. In the meantime, the provisions provide a reasonable incentive for employers to speed compliance efforts. They also sensibly allocate the transfer decision to doctors surveying the individual workers. We find, therefore, that the medical transfer and wage guarantee provisions fall within OSHA's authority to adopt methods reasonably necessary to ensure safe working conditions.[247]

C. *Pulmonary Function Tables*

OSHA included as Appendix C to the standard a set of tables that establishes predicted pulmonary function values as the norm against which employees' actual lung functions are to be measured.[248] Under the standard's medical surveillance provisions, if an employee's actual lung function falls more than twenty percent below the appropriate value specified in these tables, the employee must be retested every six months until the table's values are met.[249]

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[247] Textile Petitioners also challenge the agency's choice of respirators expressed in § 1910.1043(f)(2), 43 Fed. Reg. 27396 (1978). OSHA points to expert testimony that supports its decision to require the more expensive, reusable respirators. As the record shows that less costly single-use respirators cannot be relied upon at such dust levels, whenever the time-weighted exposure level exceeds five times the prescribed level. J.A. 3604, OSHA's determination is adequately supported.

[248] 43 Fed. Reg. 27414-18 (1978) (based on F. Knudson, *et al., The Maximal Expiratory Flow-Volume Curve*, 113 AM. REV. RESPIRATORY 587 (1976)). *See* 43 Fed. Reg. 27391.

[249] 43 Fed. Reg. 27397 (1978) (§ 1910.1043(h)(2)).

The textile industry asks us to vacate these tables.[250] The industry claims that the tables and the studies on which they are based were not made part of the record and were not available for public comment before the promulgation of the final standard. Further, the industry claims that the tables rely on studies of a sample population that does not share important characteristics with the employees who will be measured against the tables.[251]

We find petitioners' claims unwarranted. This is not an instance of a final standard that contains a provision substantially different from the proposed version.[252] The proposed version contained similar tables and the agency explicitly solicited comments on their use.[253] There

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[250] Textile Brief at 64-67.

[251] Petitioners assert that "the Knudson tables were determined from the test results of 746 non-Mexican-American, non-smoking residents of Tuscon, Arizona, who were totally free of respiratory symptoms or diseases and had no history of heart trouble . . . . In stark contrast, over half of textile industry employees smoke heavily." Textile Br. at 67 183. (citations omitted). It remains unclear whether petitioners find the sample group unrepresentative beyond the fact that they are non-smokers. In any case, petitioner's challenge on this point must fail. OSHA reasonably selected a medical predictive index of established normal functioning levels that can be used to uniformly measure any and all variations.

[252] *Cf.* National Constructor's Ass'n v. Marshall, 381 F.2d 960, 966-67, 972 (D.C. Cir. 1978) (procedural defect where OSHA rule significantly differs in final form earlier version available to Advisory Committee).

[253] The agency requested comment on "whether . . . pulmonary functions measurement[s] need to be applied differently to different ethnic groups." 41 Fed. Reg. 56498 (1976), J.A. 171 (Statement Accompanying Proposed Standards). OSHA summarized the comments received on this point in the Statement Accompanying the Final Standard at 43 Fed. Reg. 27391 (1978).

is no doubt that the general concept of pulmonary function tables as benchmarks in medical surveillance was thoroughly discussed during the informal rulemaking proceeding.[254]

Petitioners still ask us to vacate the tables finally adopted because their exact form and contents were not available for comment during the rulemaking process. Were we to agree, we would essentially preclude the agency from responding to comments during the rulemaking process,[255] for the tables finally adopted were a logical outgrowth of testimony receiving during the rulemaking proceeding.[256] The sample population employed

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[254] *See, e.g.*, J.A. 1225-26 (Statement of Grover Wrenn); J.A. 1413-14 (Statement of Hans Weill); J.A. 1561-62 (Merchant Study); J.A. 3346-47 (posthearing comments of textile industry); J.A. 3463-64 (posthearing comments of textile workers union).

[255] *See* South Terminal Corp. v. EPA, 504 F.2d 646, 659 (1st Cir. 1974). Similarly,

> As we have previously held, the requirement of submission of a proposed rule for comment does not automatically generate a new opportunity for comment merely because the rule promulgated by the agency differs from the rule it proposed partly at least in response to submissions.[51]
>
> [51] A contrary rule would lead to the absurdity that in rulemaking under the APA the agency can learn from the comments on its proposals only at the peril of starting a new procedural round of commentary. [footnote in original].

International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 632 & 632 n.51.

[256] The Knudson tables, adopted in the final standard, followed guidelines for measuring pulmonary function that were endorsed by both industry and OSHA representatives during the rulemaking proceedings. *See* J.A. 3349; 43 Fed. Reg. 27418 (1978) (Appendix D) (minimum standards for pulmonary functioning measurements).

improve the scientific reliability of these tables when compared with those used in the proposed standard.[257] Thus, we find the adoption of these tables consistent with the requirements of informal rulemaking and with the agency's duty to base the standard on the "best available evidence." [258]

CONCLUSION

Our task on review has not been easy. The record is massive and unwieldy; [259] it reveals numerous medical and technical issues in need of continued study. Congress, however, has made it clear that OSHA must protect every worker from the risks of material health impairment due to occupational exposure to hazardous materials. OSHA

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[257] See 43 Fed. Reg. 27391 (1978). The Knudson tables were based on studies of males and females. The tables used in the proposed standard instead used data from 15 years earlier on only male subjects and relied on estimates to derive a full range of values. *Id.*

[258] *See* Section 6(b)(5) of the Act, 29 U.S.C. § 655(b)(5) (1976).

[259] As a constructive criticism, we offer one further observation. Although the agency amassed an impressive array of experts and assembled comments from workers, employers, scientists, and economists, the agency did not present the evidence in a fashion easily amenable to review.

Our review function would have been greatly facilitated if OSHA had organized the material in the rulemaking record in some logical fashion. A more systematic identification of the topics of different pieces of testimony, the comments that pertain to particular studies, and the questions that remained unanswered by the proceedings would have eased our task on review and also presented the agency's case more forcefully.

Thus, although we are satisfied that the agency met its burden on review except for the application of the standard to the cottonseed oil industry, we reach that conclusion only after a tedious and at times frustrating review of the record.

is constrained only by the requirement that its standards be technologically and economically feasible for the regulated industries. In sum, our review leads us to uphold the standard, except for its application to the cottonseed oil industry. In every aspect except that one, OSHA explained the evidence in the record it found persuasive and the policies that guided its judgment when facts proved insufficient. As for the cottonseed oil industry, however, we are unable to discern the basis for the agency's feasibility determination. We do not conclude that the standard is infeasibile for that industry; rather, we remand that portion for reconsideration or clarification by the agency.

Ordinarily, we would remove the stay of the standard that was granted for the pendency of this litigation. In view of the alleged magnitude of the consequences, however, we will defer action regarding the stay to afford petitioners 20 days to show cause why the stay should not be lifted.

It is so ordered.

APPENDIX B

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

September Term, 1979

No. 78-1562

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, et al., *Petitioners*

v.

RAY MARSHALL, Secretary of Labor,
United States Department of Labor, et al., *Respondents*

and Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987, 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016 and 78-2018

Petitions for Review of Orders of the Occupational Safety and Health Administration

JUDGMENT
Filed October 24, 1979

These causes came on to be heard on petitions for review of orders of the Occupational Safety and Health Administration and were argued by counsel. On consideration thereof, it is

ORDERED AND ADJUDGED, by this Court, that the orders of the Occupational Safety and Health Administration on review herein are affirmed in part and the cases are remanded for further proceedings, in accordance with the opinion of this Court filed herein this date.

Per Curiam

FOR THE COURT
/s/ GEORGE A. FISHER
George A. Fisher
Clerk

Date: October 24, 1979

Opinion for the Court filed by Senior Circuit Judge Bazelon.

APPENDIX C

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

September Term, 1979

No. 78-1562

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, *Petitioners*

v.

RAY MARSHALL, Secretary of Labor,
United States Department of Labor, et al., *Respondents*

and Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987, 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016 and 78-2018

BEFORE: Bazelon, Senior Circuit Judge; Tamm and Robinson, Circuit Judges

ORDER AMENDING JUDGMENT

Filed January 11, 1980

IT IS ORDERED, by the Court, that the judgment filed in these cases on October 24, 1979, is hereby amended by striking all of the present third and fourth lines of paragraph two of the judgment and inserting, in lieu thereof, the following:

> "the record is remanded for supplementation and clarification in accordance with the opinion of this Court filed herein this date (October 24, 1979)."

As amended, the entire second paragraph of this Court's judgment filed October 24, 1979, shall read as follows:

> "ORDERED AND ADJUDGED, by this Court, that the orders of the Occupational Safety and Health Administration on review herein are affirmed in part and the record is remanded for supplementation and clarification in accordance with the opinion of this Court filed herein this date (October 24, 1979)."

Per Curiam

FOR THE COURT

/s/ GEORGE A. FISHER
George A. Fisher
Clerk

APPENDIX D

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

September Term, 1979

No. 78-1562

AMERICAN FEDERATION OF LABOR & CONGRESS OF INDUSTRIAL ORGANIZATIONS, et al., *Petitioners*

v.

RAY MARSHALL, Secretary of Labor, United States Department of Labor, et al., *Respondents*

and Consolidated Case Nos. 78-1736, 78-1979, 78-1980, 78-1981, 78-1982, 78-1983, 78-1984, 78-1986, 78-1987, 78-1988, 78-1989, 78-1990, 78-1991, 78-1992, 78-1993, 78-2013, 78-2014, 78-2016 and 78-2018

BEFORE: Bazelon, Senior Circuit Judge; Tamm and Robinson, Circuit Judges

ORDER

Filed January 11, 1980

Upon consideration of the petitions for rehearing submitted by the various parties, it is

ORDERED, by the Court, that the aforesaid petitions for rehearing are denied.

Per Curiam

FOR THE COURT

/S/ GEORGE A. FISHER
George A. Fisher
Clerk